CERCLA

Preliminary Assessment Report

Illinois Environmental Protection Agency
P.O. Box 19276,
Springfield, IL 62794-9276

Executive Summary

INTRODUCTION

Precision Chrome Incorporated was placed on the Comprehensive Environmental Resource Compensation and Liability Inventory System (CERCLIS) list on August 28, 1990 as a site discovery. The site was placed on CERCLIS because of the sites' potential danger to life and health of wildlife and human populations. A "Part A" Hazardous Waste Notification form was submitted to the Illinois Environmental Protection Agency (IEPA) in November 1980 that indicated the nature of business and handling of a hazardous substance, chromic acid. Soil, groundwater and surface water impoundments were sampled, analyzed and found to contain chromium (hexavalent and trivalent) beyond the quality standards for each media. The IEPA is performing the Preliminary Assessment (P.A.) under the authority of CERCLA as amended by SARA.

The Preliminary Assessment is being conducted to collect information sufficient to support a decision regarding the need for further action under CERCLA/SARA. The assessment will investigate & discuss the type of site, operational history, the four environmental pathways (groundwater, surface water, soil exposure and air releases) and the environmental hazards associated with the site. The only RCRA action associated with this site, past or present is the submittal of a closure plan for the surface impoundments (main impoundment and overflow pond) on July 28, 1992. The

closure will be effective at such time as the facility decides that the impoundments are at the end of their service life.

Precision Chrome Inc. ILD089062871 is located on property 0.75 miles southeast of downtown Fox Lake at the northeast corner of the intersection of Honing Road (formerly Commercial Avenue) and Precision Road, Fox Lake, Illinois in Lake County (Figure 1). The impoundments are located approximately 100 feet east of the aforementioned intersection. The plant building is approximately 200 feet north of the intersection. The site specific location of the facility is in the NE 1/4, SE 1/4, SW 1/4, SW 1/4 of Section 10, Township 45 North - Range 9 East (Figure 2). The property consists of approximately 2 acres all of which, except the driveway, parking lot and surface impoundments, is currently vegetated with various types and sizes of grasses, weeds, bushes and trees. The site is situated in a light industrial/commercial area and is bordered on the north by the Fox Lake/North Shore Sanitary District (NSSD) Sewage Treatment Plant (STP), south by Honing Road across which is a parcel of land owned by an unknown party, east by vacant land and west by Precision Road across which is the Kienzle Corporation.

HISTORY

Previous site inspections were conducted by IEPA's Maywood Field Office from December 1985 through January 1992, with sampling conducted on all occasions except January 1992. Samples were obtained from the soil, water in the main impoundment, sediment in the main impoundment and water from the impoundments' recharge/make-up well. Analysis revealed chromium and hexavalent chromium as follows:

12/85 -	Soil	150.0ppm chromium
	Water in impoundment	6.875ppm chromium
2/86 -	Fox Lake/NSSD well	8.2ppm chromium
4/86 -	Water in impoundment	7.4ppm chromium
	Water in impoundment	6.8ppm hexavalent chromium
7/86 -	Sodium bisulfate added to impoundment to reduce hexavalent or change to trivalent.	
	Subsequent samples - water	1.3ppm chromium
		0.2ppm hexavalent
9/87 -	Recharge/make-up well	8.375ppm chromium
10/91 -	Impoundment sediment	0.4ppm barium TCLP
		0.132ppm chromium TCLP
	Recharge/make-up well	1.985ppm chromium
	Cooling water discharge into impoundment	1.575ppm chromium
	Water in impoundment	1.58ppm chromium

There has been no indication that the facility has placed any plating wastes anywhere on the site property including directly into the impoundments.

Review of a number of aerial photographs dating from 1966 to 1988 indicates the same location of site features over the years with no unusual land surface markings. The subject impoundments appeared in each of the photographs reviewed. Each photo also revealed an abnormal shade associated with

the water in the impoundments, relative to the appearance of other water bodies in the area. The remainder of the site contained various types of vegetative cover, a compacted dirt parking area south of the plant building and an asphalt street and parking area west of the plant building, as is the current situation (1992).

The Precision Chrome Incorporated facility has operated as a chrome electroplater since 1966, the operation being established at its present location. Precision Chrome manufactures steel shafts used primarily in hydraulic equipment. The facility employs approximately 30 people. Precision Chromes' process begins with the purchase of steel tubing and bar stock. This material is then centerline ground to final size, induction hardened and then chrome electroplated. Quenching during the induction hardening process is completed with a heat exchanger and non-contact cooling water from the on-site surface impoundment. The plating tanks are maintained at a constant temperature by use of the non-contact cooling water also. The facility indicates that it does not generate a regulated hazardous waste. Precision Chrome does generate chromic acid solution at a rate of 40 drums every 3 to 4 months. The company also noted that for the past 12 years this waste has been sent to a facility meeting the special requirements for handling hazardous waste which is used or re-used.

RECONNAISSANCE VISIT

A CERCLA pre-remedial site reconnaissance was conducted on August 30, 1992, by Mr. Ken Corkill of the Illinois EPA. The site was observed to be restricted on three sides as there is a 6 foot tall chain link fence topped with three strands of barbed wire constructed around the facility. The only unrestricted side being on the south along Honing Road which allows access to the entire piece of property including the impoundments. Surveying the site, there were no signs of recreational use on the property. However, at the end of Honing Road, which changes from asphalt to gravel (a wire cable crosses the road at this point) approximately 250 feet east of the mentioned intersection, there were numerous items; bottles, cans, old chairs, sofas, household trash, etc. indicating that this location is a frequently used dumping area. Evidence of recreational use such as shotgun shell casings, etc. were not visible at this point. During a short survey of the property beyond the cable, this type of activity does take place. The property east of Precision Chrome is used in this manner apparently due to it being vacant and the abundance of under and over growth. Noted along the eastern wall of the plant building at the southeast corner, a concrete pad was present (see figure 3). The pad was bordered on two sides by a concrete containment trough approximately 8 inches wide, of unknown depth and filled with 1/2 inch diameter gravel. The third side was immediately adjacent to the plant building with the fourth abutting the

gravel parking area/driveway. The pad appeared to have a slight northerly and easterly slope, away from the building and driveway. Present on the pad, at the time of the reconnaissance, was a Waste Management roll-off box containing a number of cartons, used sanding/grinding belts, used rags, etc. There were no indications that the container might hold hazardous wastes. Also present were 6 fifteen gallon drums labled chromic acid. A determination was not made as to the drums contents level. A survey of the pad surface found no visible contamination or staining. A close scrutinization of the rest of the site revealed nothing unusual or obviously contaminated. One area was observed to lack vegetation. This area was approximately 50 feet southeast of the southeast corner of the plant building and 15 - 20 feet north of the main impoundment, located near the front of a semi trailer. The area measured approximately 10 feet x 10 feet and appeared to have had an oily substance disposed there or had been burned at some previous time. The main surface impoundment, which is the source of non-contact cooling water for the facility's chrome plating tanks, measures approximately 125 feet north to south and 70 feet east to west with a depth of 5-6 feet was noted to be a uniform medium green color. The overflow impoundment measures approximately 70 feet north to south and 30 feet east to west. There was no vegetation visible in the impoundments or along the banks at waters edge. Vegetation began approximately six inches above the water line around

the entire perimeter of the impoundments. Soil throughout the entire site consists mainly of sandy-clay loam. General site slope is in a south-southeast direction toward the impoundments. A low spot in the east yard of the facility appears to be the lowest point on site other than the impoundments. An area of gravel approximately 5 feet x 5 feet is present at that location apparently serving as a drain. (See site photos taken on August 30, 1992 and locations of each, after text). An outlet was not found. There does not appear to be any one or two discernible surface drainage routes. Moisture on site tends to infiltrate into the soil and drift. Any moisture which makes it off-site flows south-southeast mainly in a sheet type flow. Surface water flow at this point is speculative, possibly being able to enter Myers Bay at the north end of a canal on the east side of Kings Island via storm tiles and drainage ditches, then entering Pistakee Lake.

Residential property exists north, south and west within 1/4 mile of the site. The nearest residence is approximately 1000 feet south of the site. Pistakee Lake/Myers Bay is approximately 1250 feet southwest of the site. Surface topography remains relatively flat immediately on and around the site. Beyond 1/4 mile of the site, terrain rises and falls approximately 40-50 feet characteristically of glacial terrain. Terrain elevation between the site and Pistakee Lake/Myers Bay decreases 10 to 15 feet in a southwest

direction toward the lake. Light industry/commercial businesses within close proximity of the site are Kienzle Corporation, A-1 Recycling, Steel Fabricators, Jack Frost Iron Works, C.H Imports (auto reconstruction) and Meiers Masterbuilt Fences, all located west along Honing Road up to Sayton Road; Fox Lake/NSSD wastewater treatment plant, north and northwest; John Crane Inc. and Fox Lake Auto Sales, northwest, west of Sayton Ave.; and Dip Stick Oil & Lube, southwest, west of Sayton Ave (See Figure 4). Overall land use within the four mile radius of the site is predominantly residential with much of the light industrial use dominating this particular 1/4 mile area around the site. Other commercial properties tend to be spread throughout.

MIGRATION PATHWAYS

As mentioned previously, there have been inspections and various sampling events conducted at the Precision Chrome site. Of the four environmental pathways (groundwater, surface water, soil exposure and air releases) contamination has been found in groundwater, surface water and in the soil. Analysis of groundwater, surface water and soil samples taken from and around the surface impoundment on site revealed contaminants which are attributable to the chrome plating business.

The Site is located in the Woodfordian glacial moraines in the Valporaiso Morainic System. Specifically located seven

miles south of the Illinois-Wisconsin boarder on the Fox Lake Moraine which is part of the Joliet Sub-Lobe of the Lake Michigan Lobe of the Woodfordian glacial moraines in Illinois. The Fox Lake Moraine is a kame-moraine which can be traced for approximately 25 miles south from the Wisconsin state line. Most of it is gravel, being clayey in places and is assigned to the Haeger Till Member of the Wedron Formation. The Haeger Till Member consists of 12 feet of calcareous, gravelly, silty yellow-gray till overlying the Yorkville Till Member and overlain by the Richland Loess. In some isolated hills the Haeger Member may be as much as 50 to 100 feet thick, but is generally thinner. The Richland Loess is a massive tan silt that is calcareous below the leached zone of the Modern Soil and is locally fossiliferous. This formation is as much as 20 feet thick along the east bluff of the Illinois Valley north of Peoria but thins to 1 to 2 feet in the Chicago area and near Fox Lake. The soil overlying the Richland Loess is referred to as the Modern Soil (the term "Modern Soil" is applied to any soil profile related to the present topographic surface of Illinois and does not carry any implication of soil type in the soil science classification). The soil ranges from very shallow to several feet in depth and is developed in any sediment that immediately underlies the existing land surface.

Regional water well records and the Illinois State Geological Survey indicate that glacial drift deposits in the area vary

in thickness from approximately 90 feet at the eastern edge of the county at Lake Michigan to approximately 300 feet in certain areas toward the western edge of the county. Beneath the glacial deposits, and hydrologically connected to them, is the upper bedrock formations consisting mainly of beds of dolomite and shale which dip easterly at about 10 to 15 feet per mile (ISWS/BUL 60-20/76). This unit is the Silurian-dolomite and referred to as the shallow dolomite aquifer system, encountered at depths from 90 feet to 300 feet. Thickness ranges from almost zero west to about 200 feet east. Water may be obtained from cracks and crevices penetrated by a well. Underlying this system is the Maquoketa Group composed primarily of non-water-bearing shales (considered a confining layer in this case) that separate the Silurian dolomite aquifer from deeper water-bearing units. These shales lie at depths about 200 feet west to 400 feet east and range in thickness from 250 feet west to 100 feet east. Below this group, a sequence of hydrologically connected sandstones and dolomites exist. This aquifer is the Cambrian-Ordovician aquifer. Most wells located within four miles of the site range in depth from 40 feet to 500 feet. The top of the aquifer of concern is approximately 10 feet beneath land surface, where groundwater in the area is generally contacted.

Information obtained from local water departments, U.S.G.S. topographic maps and U.S. Census data indicate water for Fox

Lake and surrounding areas is obtained via groundwater. The majority of the population within four miles of this site are served by public water supply systems using groundwater as a drinking water source. The remaining population utilize private groundwater wells for their drinking water requirements. The nearest groundwater wells are Precision Chromes' two wells. One, approximately 120 feet deep, provides the plant with potable water, the other, 30 feet deep is used as a recharge/make-up water source for the surface impoundment. The nearest public water supply well is operated by the City of Fox Lake approximately 1000 feet northwest of the site. The nearest private well, other than the two on-site wells, is located approximately 1000 feet south of the site. All wells located within the 4 mile site radius are considered wells of concern. Population served by wells within the 4 mile radius are dispersed as follows:

Distance	Population Served By Public Wells	Population served By Private Wells
0-1/4 mile	1894	30
1/4 - 1/2 mile	0	0
1/2 - 1 mile	2275	134
1 - 2 miles	130	1633
2 - 3 miles	9000	4158
3 - 4 miles	8142	2079
Totals	21,441	8034

There are approximately 60 non-community public drinking water wells (restaurants, parks, gas stations, etc.) within four miles of the site. Direction of groundwater movement

on-site is dependent on the water levels of Lake Pistakee and the Fox River.

Surface water on site has been sampled, as mentioned previously, with contamination being confirmed. Chromium fractions were found in the impoundment. Based on composition, silts and sands in the glacial till, on-site soils could act as a conduit for surface water to migrate to groundwater and vice-versa. Based on potential site drainage patterns observed during the site reconnaissance and on aerial photographs of the site and surroundings, the probable point of entry (PPE) to surface water is at the north end of a canal in Myers Bay, east of Kings Island in Pistakee Lake. The PPE is located approximately 1250 feet southwest of the sites southwest corner. The 15-mile in-water segment of the surface water route begins in Pistakee Lake, continues into the Fox River were it terminates at a point half-way between the communities of Fox River Valley Gardens and Fox River Grove. There are no surface water intakes for drinking water purposes along the 15-mile route. Also, there are no known surface water intakes for irrigation purposes. Fisheries have been identified to be from the PPE continuing to the termination of the 15-mile in-water segment. Sensitive environments exist on site property as a wetland and pond (palustrian, open water, semipermanently flooded). The approximate wetland frontage is 300 feet. Numerous sensitive environments exist throughout the 4 mile site radius as

wetlands and ponds (see wetland map). Along the 15-mile in-water segment (Pistakee Lake shoreline and the Fox River river bank) approximately 12 - 15 miles of wetland frontage exists as palustrian, emergent or forested broadleaf deciduous, temporarily, seasonally or semi-permanantly flooded.

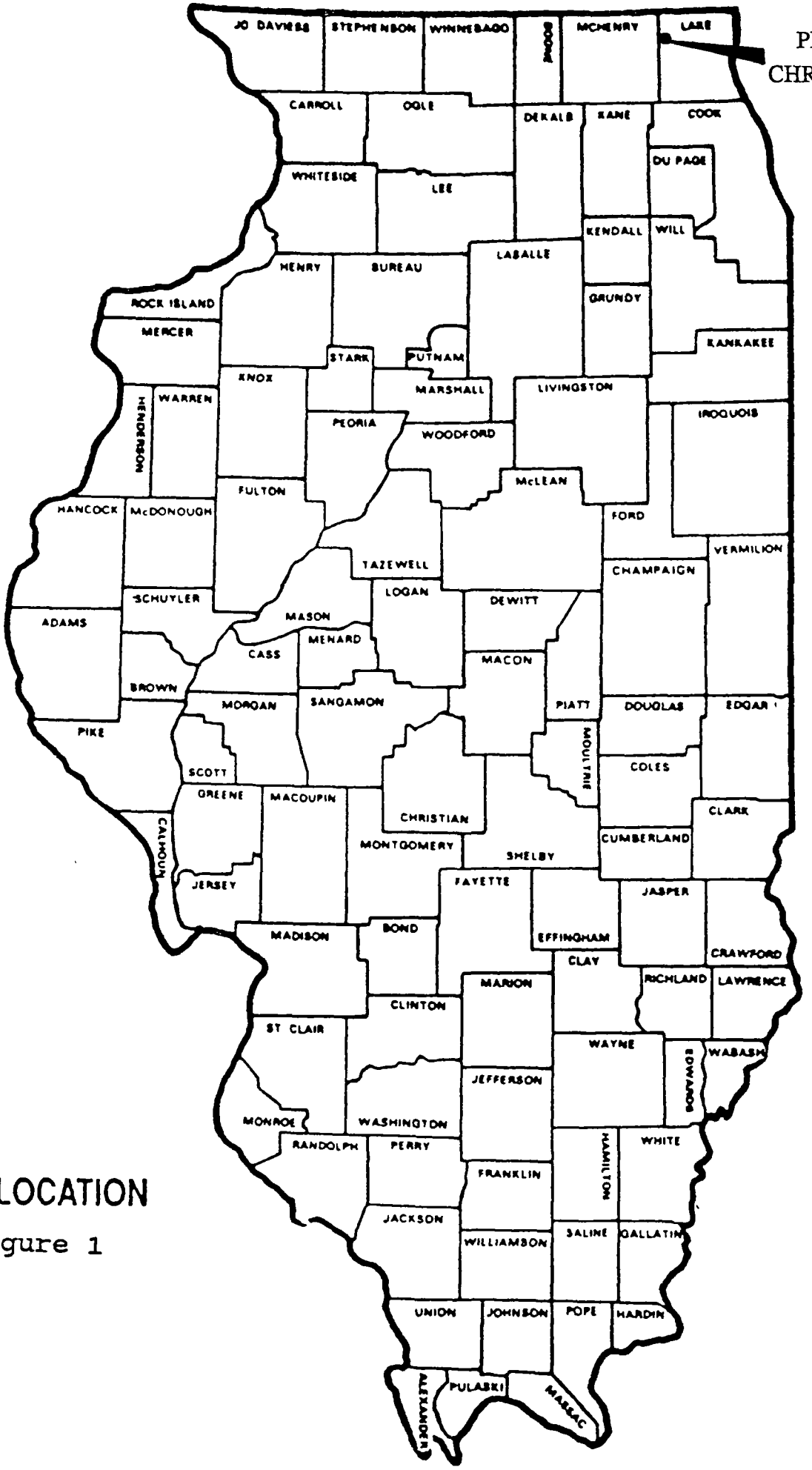
There has been no documentation or complaints of air contamination from the site. Air monitoring with photoionization equipment (HNU) has taken place during each of the past site visits with only background readings being registered. Within a 4-mile radius of the site the population is calculated to be approximately 30,650 persons.

Contamination of soil has been confirmed through the sampling events previously noted. How the soil was contaminated is unknown as of the writing. The nearest individual and regularly occupied building is on-site, the Precision Chrome plant building. The nearest off-site individual and regularly occupied building is the Kienzle Corporation building located approximately 200 feet west of the sites western property line. There are no schools, daycare facilities or persons living on-site or within 200 feet of suspected contamination.

CONCLUSION

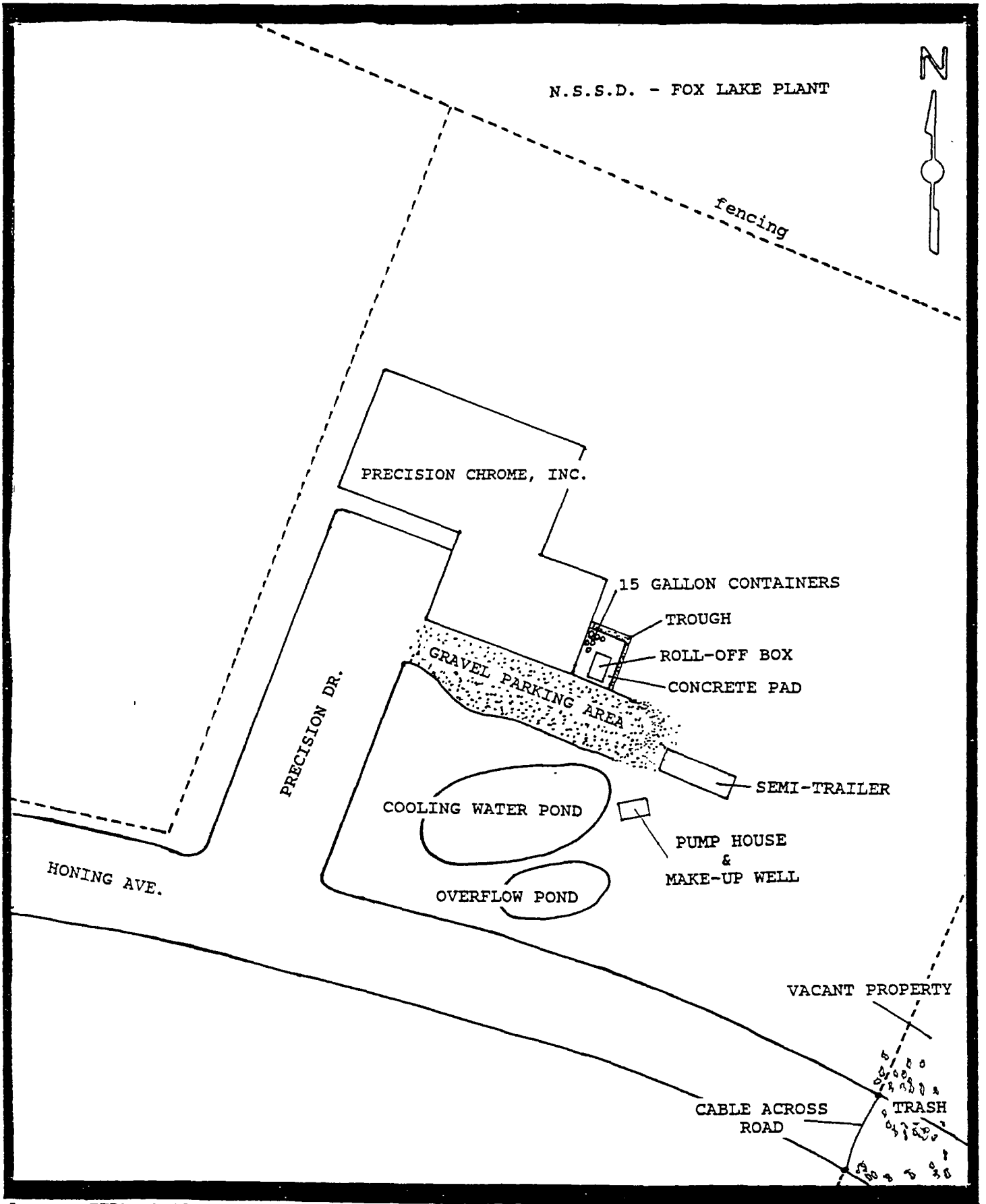
From the information gathered for this text it can be seen that there has been confirmed releases and threats of releases of hazardous constituents on and potentially off site. These present an immediate and significant risk of harm to human (and wildlife) life and health and threat to the environment. These factors constitute a recommendation of issuance of a high priority for further site investigation.

PRECISION
CHROME, INC.



SITE LOCATION

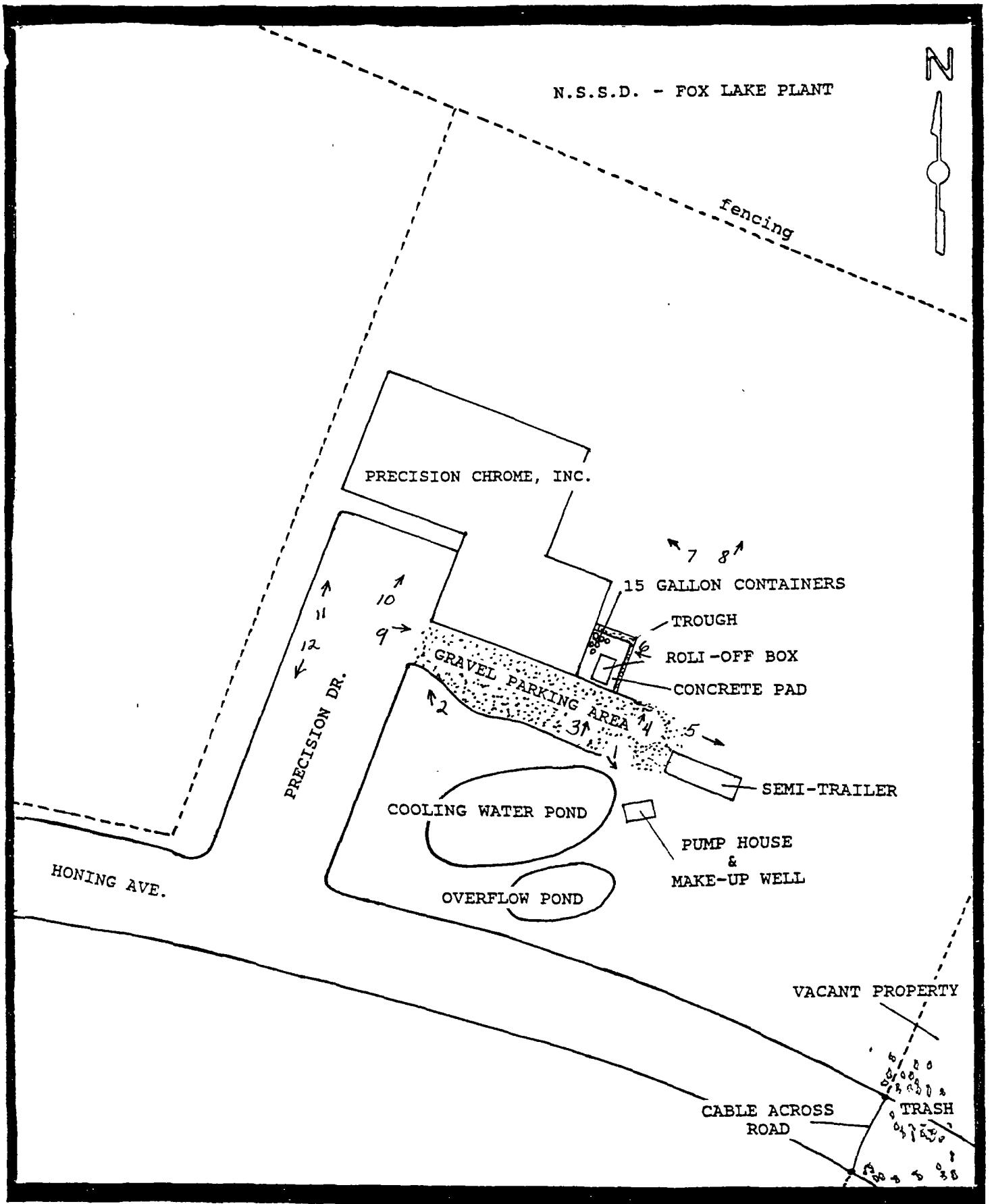
Figure 1



Source: IEPA, 1992. Base Map: USGS, Fox Lake 7.5 Min. Quad.

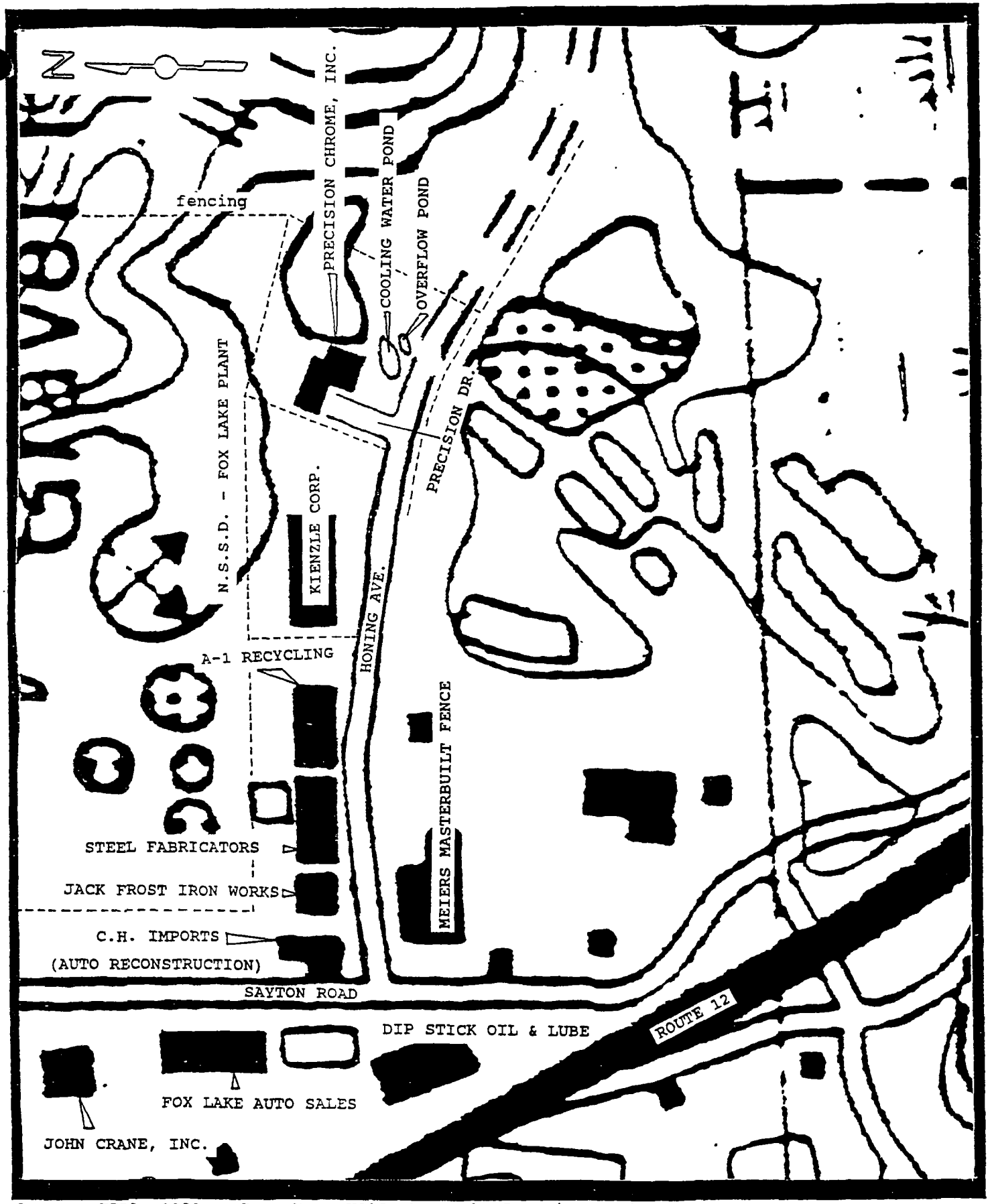
SITE FEATURES

FIGURE 3



Source: IEPA, 1992. Base Map: USGS, Fox Lake 7.5 Min. Quad.

Photo Locations



Source: IEPA, 1992. Base Map: USGS, Fox Lake 7.5 Min. Quad.

AREA MAP

FIGURE 4

SDMS US EPA Region V

Imagery Insert Form

Some images in this document may be illegible or unavailable in SDMS. Please see reason(s) indicated below:

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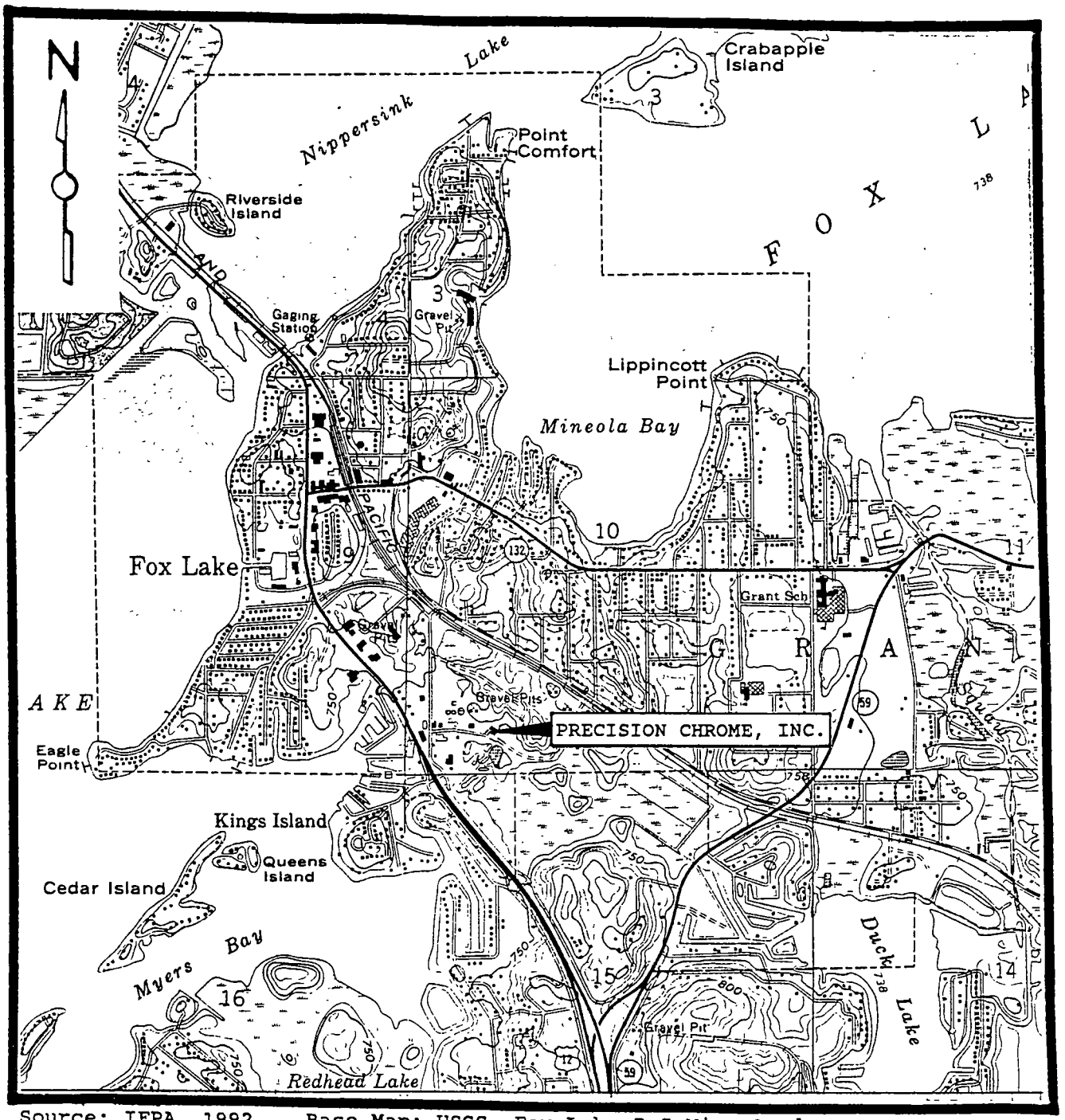
4- MILE RADIUS MAP & 15-MILE SURFACE WATER ROUTE MAP

☐ **Other:**



Source: IEPA, 1992. Base Map: USGS, Fox Lake 7.5 Min. Quad.

SITE MAP

FIGURE 2

DATE: 8-30-92

TIME: 2:30 p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 1

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC

COMMENTS: PICTURE TAKEN TOWARD

S-SE

COOLING WATER & MAKE-UP

WATER PUMP HOUSE &

COOLING WATER POND

DATE: 8-30-92

TIME: 2:45 p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 2

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC.

COMMENTS: PICTURE TAKEN TOWARD

NW

LEFT - KIENZLE CORP.

CENTER - NSSD, FOX LAKE PLANT.

RIGHT - SW CORNER OF PRECISION.

DATE: 8-30-92

TIME: 2:50 p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 3

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC

COMMENTS: PICTURE TAKEN TOWARD

N-NE.

SE CORNER OF PRECISION.

ROLL OFF BOX ON CONCRETE

PAD. CONTAINMENT ON TWO SIDES

DATE: 8-30-92

TIME: 2:50 p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 4

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC.

COMMENTS: PICTURE TAKEN TOWARD

NE.

AS ABOVE. EASTERN

PROPERTY AREA.

DATE: 8-30-92

TIME: 2:52 p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 5

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC

COMMENTS: PICTURE TAKEN TOWARD

EAST.

SAME AS PHOTO #4.

TRAILER PARKING AREA.

DATE: 8-30-92

TIME: 2:57 p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 6

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC.

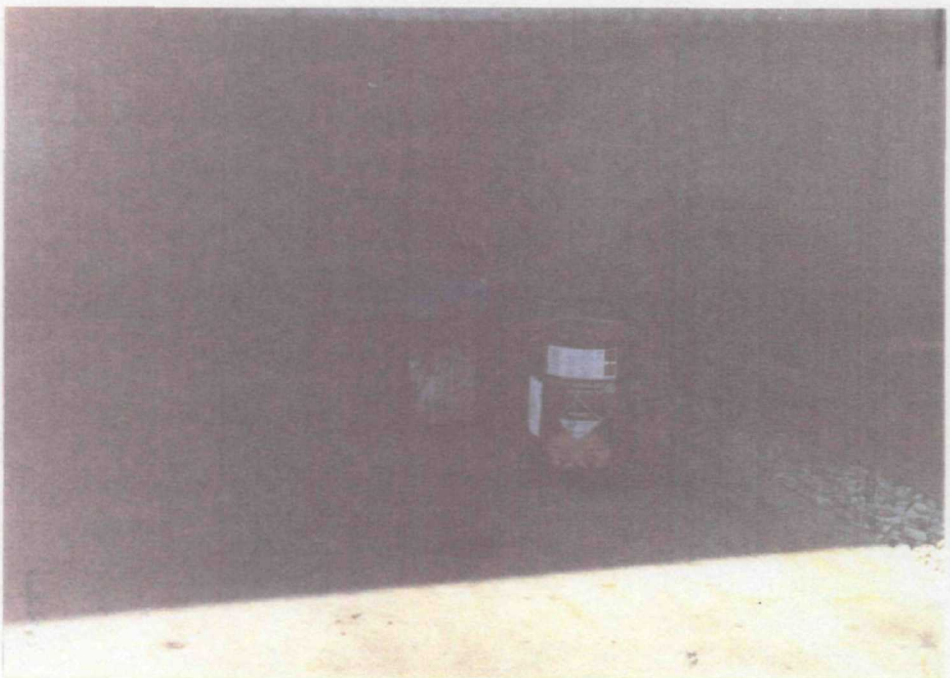
COMMENTS: PICTURE TAKEN TOWARD

WEST.

15 GALLON CONTAINERS

LABELED CHROMIC ACID ON

CONTAINMENT PAD.



TE: 8-30-92

TIME: 3:05 p.

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 7

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC

COMMENTS: PICTURE TAKEN TOWARD

NORTH.

FROM SE SIDE OF BUILDING

TOWARD NE CORNER OF BUILDING.

NSSD - FOX LAKE PLANT IN BACKGROUND.

DATE: 8-30-92

TIME: 3:05 p.

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 8

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC.

COMMENTS: PICTURE TAKEN TOWARD

NORTH.

AS ABOVE. HELICOPTER

PAD + NSSD EASTERN +

SOUTHERN PROPERTY BOUNDARY.

TE: 8-30-92

TIME: 3:25p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 9

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC

COMMENTS: PICTURE TAKEN TOWARD

EAST.

SOUTH WALL OF PRECISION.

SOUTH GRAVEL PARKING AREA.

PONDS ARE OUT OF PICTURE - RIGHT.

DATE: 8-30-92

TIME: 3:25p

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 10

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC.

COMMENTS: PICTURE TAKEN TOWARD

N-NE.

WESTERN PORTION OF BUILDING.

WEST ASPHALT PARKING AREA.

DATE: 8-30-92

TIME: 3:25 p.

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 11

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC

COMMENTS: PICTURE TAKEN TOWARD NORTH.

WESTERN PORTION OF BUILDING & WEST PROPERTY BOUNDARY.

NSSD-FOX LAKE PLANT IN BACKGROUND.

DATE: 8-30-92

TIME: 3:30 p.

PHOTOGRAPH TAKEN BY:

K. CORKILL

PHOTO NUMBER: 12

LOCATION: LAKE CO.

ILD089062871/L0970205001

PRECISION CHROME, INC.

COMMENTS: PICTURE TAKEN TOWARD SOUTH.

PRECISION DRIVE TOWARD SOUTH OF PROPERTY. PONDS ARE OUT OF PICTURE-LEFT.

OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

EPA Potential Hazardous Waste Site Preliminary Assessment Form

Identification

State: IL | CERCLIS Number: ILD089062871

CERCLIS Discovery Date: 8-28-90

1. General Site Information

Name: PRECISION CHROME INC.	Street Address: 105 PRECISION ROAD				
City: FOX LAKE	State: IL	Zip Code: 60020	County: LAKE	Co. Code: 097	Cong. Dist:
Latitude: 42° 23' 19.0" Longitude: 88° 10' 29.0"	Approximate Area of Site: 2 Acres ____ Square Ft		Status of Site: ☒ Active ☐ Not Specified ☐ Inactive ☐ NA (GW plume, etc.)		

2. Owner/Operator Information

Owner: PRECISION CHRIME INC.	Operator: SAME
Street Address: 105 PRECISION ROAD	Street Address:
City: FOX LAKE	City:
State: IL / Zip Code: 60020 / Telephone: (708) 587-1515	State: / Zip Code: / Telephone: ( )

Type of Ownership:
- ☒ Private
- ☐ Federal Agency — Name ____
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other ____

How Initially Identified:
- ☐ Citizen Complaint
- ☐ PA Petition
- ☐ State/Local Program
- ☒ RCRA/CERCLA Notification 8-15-80
- ☐ Federal Program
- ☐ Incidental
- ☐ Not Specified
- ☐ Other ____

3. Site Evaluator Information

Name of Evaluator: KENNETH W CORKILL	Agency/Organization: ILL. EPA/RPMS	Date Prepared: 4-29-92
Street Address: 2200 CHURCHILL RD.	City: SPRINGFIELD	State: IL.
Name of EPA or State Agency Contact: KENNETH W. CORKILL	Street Address: SAME	
City: SAME	State: IL	Telephone: (217) 782-6760

4. Site Disposition (for EPA use only)

Emergency Response/Removal Assessment Recommendation:
- ☐ Yes
- ☐ No
- Date: ____

CERCLIS Recommendation:
- ☐ Higher Priority SI
- ☐ Lower Priority SI
- ☐ NFRAP
- ☐ RCRA
- ☐ Other ____
- Date: ____

Signature:

Name (typed):

Position:

CERCLIS Number: ILD089062871

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site (check all that apply):
- ☐ Industrial
- ☒ Commercial
- ☒ Residential
- ☐ Forest/Fields
- ☐ Agriculture
- ☐ Mining
- ☐ DOD
- ☐ DOE
- ☐ DOI
- ☐ Other Federal Facility
- ☐ Other _____

Site Setting:
- ☒ Urban
- ☐ Suburban
- ☐ Rural

Years of Operation:
Beginning Year 1966
Ending Year IN OPERATION
☐ Unknown

Type of Site Operations (check all that apply):
- ☒ Manufacturing (must check subcategory)
  - ☐ Lumber and Wood Products
  - ☐ Inorganic Chemicals
  - ☐ Plastic and/or Rubber Products
  - ☐ Paints, Varnishes
  - ☐ Industrial Organic Chemicals
  - ☐ Agricultural Chemicals (e.g., pesticides, fertilizers)
  - ☐ Miscellaneous Chemical Products (e.g., adhesives, explosives, ink)
  - ☐ Primary Metals
  - ☒ Metal Coating, Plating, Engraving
  - ☐ Metal Forging, Stamping
  - ☐ Fabricated Structural Metal Products
  - ☐ Electronic Equipment
  - ☐ Other Manufacturing
- ☐ Mining
  - ☐ Metals
  - ☐ Coal
  - ☐ Oil and Gas
  - ☐ Non-metallic Minerals
- ☐ Retail
- ☐ Recycling
- ☐ Junk/Salvage Yard
- ☐ Municipal Landfill
- ☐ Other Landfill
- ☐ DOD
- ☐ DOE
- ☐ DOI
- ☐ Other Federal Facility _____
- ☐ RCRA
  - ☐ Treatment, Storage, or Disposal
  - ☐ Large Quantity Generator
  - ☐ Small Quantity Generator
  - ☐ Subtitle D
    - ☐ Municipal
    - ☐ Industrial
  - ☐ "Converter"
  - ☐ "Protective Filer"
  - ☐ "Non- or Late Filer"
- ☐ Not Specified
- ☐ Other _____

Waste Generated:
- ☒ Onsite
- ☐ Offsite
- ☐ Onsite and Offsite

Waste Deposition Authorized By:
- ☒ Present Owner
- ☐ Former Owner
- ☐ Present & Former Owner
- ☐ Unauthorized
- ☐ Unknown

Waste Accessible to the Public:
- ☒ Yes
- ☐ No

Distance to Nearest Dwelling, School, or Workplace:
80 Feet

6. Waste Characteristics Information

Source Type: (check all that apply)	Source Waste Quantity: (include units)	Tier*:
☐ Landfill		
☒ Surface Impoundment	43,750 FT³	V
☒ Drums	40	V
☐ Tanks and Non-Drum Containers		
☐ Chemical Waste Pile		
☐ Scrap Metal or Junk Pile		
☐ Tailings Pile		
☐ Trash Pile (open dump)		
☐ Land Treatment		
☐ Contaminated Ground Water Plume (unidentified source)		
☐ Contaminated Surface Water/Sediment (unidentified source)		
☐ Contaminated Soil		
☐ Other _____		
☐ No Sources		

* C = Constituent, W = Wastestream, V = Volume, A = Area

General Types of Waste (check all that apply)
- ☒ Metals
- ☐ Organics
- ☐ Inorganics
- ☐ Solvents
- ☐ Paints/Pigments
- ☐ Laboratory/Hospital Waste
- ☐ Radioactive Waste
- ☐ Construction/Demolition Waste
- ☐ Pesticides/Herbicides
- ☒ Acids/Bases
- ☐ Oily Waste
- ☐ Municipal Waste
- ☐ Mining Waste
- ☐ Explosives
- ☐ Other _____

Physical State of Waste as Deposited (check all that apply):
- ☐ Solid
- ☐ Sludge
- ☐ Powder
- ☒ Liquid
- ☐ Gas

EPA **Potential Hazardous Waste Site**
Preliminary Assessment Form - Page 3 of 4

CERCLIS Number: ILD059062871

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles:
- [X] Yes
- [ ] No

Type of Drinking Water Wells Within 4 Miles (check all that apply):
- [X] Municipal
- [X] Private
- [ ] None

Is There a Suspected Release to Ground Water:
- [X] Yes
- [ ] No

Have Primary Target Drinking Water Wells Been Identified:
- [ ] Yes
- [X] No

If Yes, Enter Primary Target Population:

_____ People

Depth to Shallowest Aquifer:

10 Feet

Karst Terrain/Aquifer Present:
- [ ] Yes
- [X] No

Nearest Designated Wellhead Protection Area:
- [ ] Underlies Site
- [X] >0 - 4 Miles
- [ ] None Within 4 Miles

List Secondary Target Population Served by Ground Water Withdrawn From:

0 - ¼ Mile	1894
> ¼ - ½ Mile	0
> ½ - 1 Mile	2409
> 1 - 2 Miles	1763
> 2 - 3 Miles	13,158
> 3 - 4 Miles	10,221
Total Within 4 Miles	29,445

8. Surface Water Pathway

Type of Surface Water Draining Site and 15 Miles Downstream (check all that apply):
- [ ] Stream
- [X] River
- [ ] Pond
- [X] Lake
- [ ] Bay
- [ ] Ocean
- [ ] Other _____

Shortest Overland Distance From Any Source to Surface Water:

1250 Feet

.24 Miles

Is There a Suspected Release to Surface Water:
- [X] Yes
- [ ] No

Site is Located in:
- [ ] Annual - 10 yr Floodplain
- [ ] >10 yr - 100 yr Floodplain
- [ ] >100 yr - 500 yr Floodplain
- [X] >500 yr Floodplain

Drinking Water Intakes Located Along the Surface Water Migration Path:
- [ ] Yes
- [X] No

Have Primary Target Drinking Water Intakes Been Identified:
- [ ] Yes
- [X] No

If Yes, Enter Population Served by Primary Target Intakes:

_____ People

List All Secondary Target Drinking Water Intakes:

Name	Water Body	Flow (cfs)	Population Served
NONE			

Total within 15 Miles _____

Fisheries Located Along the Surface Water Migration Path:
- [X] Yes
- [ ] No

Have Primary Target Fisheries Been Identified:
- [ ] Yes
- [X] No

List All Secondary Target Fisheries:

Water Body/Fishery Name	Flow (cfs)
PISTAKEE LAKE	52.7
FOX RIVER	52.7

EPA **Potential Hazardous Waste Site**
Preliminary Assessment Form - Page 4 of 4

CERCLIS Number: ILD089062871

8. Surface Water Pathway (continued)

Wetlands Located Along the Surface Water Migration Path:
- [x] Yes
- [ ] No

Have Primary Target Wetlands Been Identified:
- [ ] Yes
- [x] No

List Secondary Target Wetlands:

Water Body	Flow (cfs)	Frontage Miles
LAKE	52.7	4.1
RIVER	52.7	9.0

Other Sensitive Environments Located Along the Surface Water Migration Path:
- [ ] Yes
- [x] No

Have Primary Target Sensitive Environments Been Identified:
- [ ] Yes
- [x] No

List Secondary Target Sensitive Environments:

Water Body	Flow (cfs)	Sensitive Environment Type

9. Soil Exposure Pathway

Are People Occupying Residences or Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination:
- [ ] Yes
- [x] No

If Yes, Enter Total Resident Population:

_____ People

Number of Workers Onsite:
- [ ] None
- [x] 1 - 100
- [ ] 101 - 1,000
- [ ] >1,000

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination:
- [ ] Yes
- [x] No

If Yes, List Each Terrestrial Sensitive Environment:

10. Air Pathway

Is There a Suspected Release to Air:
- [ ] Yes
- [x] No

Enter Total Population on or Within:

Onsite	30
0 - ¼ Mile	45
> ¼ - ½ Mile	376
> ½ - 1 Mile	3356
>1 - 2 Miles	3185
>2 - 3 Miles	12,883
>3 - 4 Miles	10,744
Total Within 4 Miles	30,619

Wetlands Located Within 4 Miles of the Site:
- [x] Yes
- [ ] No

Other Sensitive Environments Located Within 4 Miles of the Site:
- [ ] Yes
- [x] No

List All Sensitive Environments Within ½ Mile of the Site:

Distance	Sensitive Environment Type/Wetlands Area (acres)
Onsite	WETLAND (300' FRONTAGE)
0 - ¼ Mile	WETLAND (20 AC.)
> ¼ - ½ Mile	WETLAND (40 AC.)

Supporting Documentation

Supporting Documents

Table of Contents

Reference Number	Documentation
01	October 31, 1991 RCRA Inspection Report from IEPA, Maywood Field Office.
02	October 31, 1991 RCRA inspection sampling event analysis completed by IEPA lab.
03	January 24, 1992 RCRA Inspection Report with narrative of site sampling history 11/85 - 10/91 from IEPA, Maywood Field Office.
04	Illinois State Geological Survey, Bulletin 95 pages 224-239.
05	Illinois State Water Survey, Bulletin 60-20 1976.
06	USGS Water Resousces Investigation 13-75, Drainage Areas for Illinois Streams.
07	IEPA Division of Public Water Supplies, Groundwater Raw Source Location Report.
08	Federal Emergency Management Agency, National Flood Insurance Program, Fox Lake Flood Insurance Map, 6-17-86.
09	July 28, 1992 Baxter & Woodman environmental engineers submittal of a closure plan for the surface impoundment.
11	Illinois Fishing Guide indicating fish species present in Pistakee Lake and the Fox River.

Reference Number 1

Illinois Environmental Protection Agency
Division of Land Pollution Control

RCRA INSPECTION REPORT

ISEPA #: IL D089062871	IEPA #: 0972020001		
Facility Name: Precision Chrome		Phone #: 708-587-1545	
Street Address: 105 Precision Road		County: Lake	
City: Fox Lake	State: IL	Zip: 60020	
Region: Maywood	Inspection Date: 10/30/91	From: 1300	To: 2300
Weather: Sad overcast			

TYPE OF FACILITY

Notified As: Gen	Regulated As: See below
LDF? No HPV? No	90-Day F/U Required?: YES ____ NO ✓

TYPE OF INSPECTION

CEI: ____ Sampling: ✓ Citizen Complaint: ____ Closed: ____ Other: ____

CME/O&M: ____ Record Review: ____ Follow-Up to Inspection of: ____ Withdrawal: ____

NON-REGULATED STATUS

SQG: ____ Claimed Nonhandler: ✓ Other (Specify in Narrative): ____

PART A N/A

Notification Date: ___/___/___ , from (initial) or (subsequent) Notification.

Initial Part A Date: ___/___/___ Amended: ___/___/___

Part A Withdrawal requested: 11/___/85 Approved by (US)(IL) EPA: ___/___/___

PART B PERMIT APPLICATION N/A

Part B Permit Submitted: Y or N ___/___/___ Final Permit Issued: ___/___/___

ENFORCEMENT N/A

Has the firm been referred to -- USEPA: Y or N ___/___/___

Illinois Attorney General: Y or N ___/___/___ County State's Attorney: Y or N ___/___/___

ORDERS ISSUED N/A

CACO: ___/___/___ CAFO: ___/___/___ Consent Decree: ___/___/___

Federal Court Order: ___/___/___ State Court Order: ___/___/___ IPCB Order: ___/___/___

TSD FACILITY ACTIVITY SUMMARY

Activity by Process Code	On Part A?	Activity Conducted Prior to 1980?	Was Activity Ever Done?	Closed	Being done at Time of Insp.?	Exempt per 35 IAC, Sec.	On Annual Report 19	19	19

OWNER		OPERATOR	
Name	Precision Chrome	Name	Same
Address	105 Precision Rd.	Address	
City	Fox Lake	City	
State	IL Zip 60020	State	Zip
Phone #	708-587-1515	Phone #	

PERSON(S) INTERVIEWED	TITLE	PHONE #
Tom Allen	Plant Mgr	708-587-1515

INSPECTION PARTICIPANT(S)	AGENCY/TITLE	PHONE #
Mitch Levin	IEPA/EPE	708-531-5900

PREPARED BY	AGENCY/TITLE	PHONE #
Mitch Levin	IEPA/EPE	708-531-5900

SUMMARY OF APPARENT VIOLATIONS

Area	Class	Section

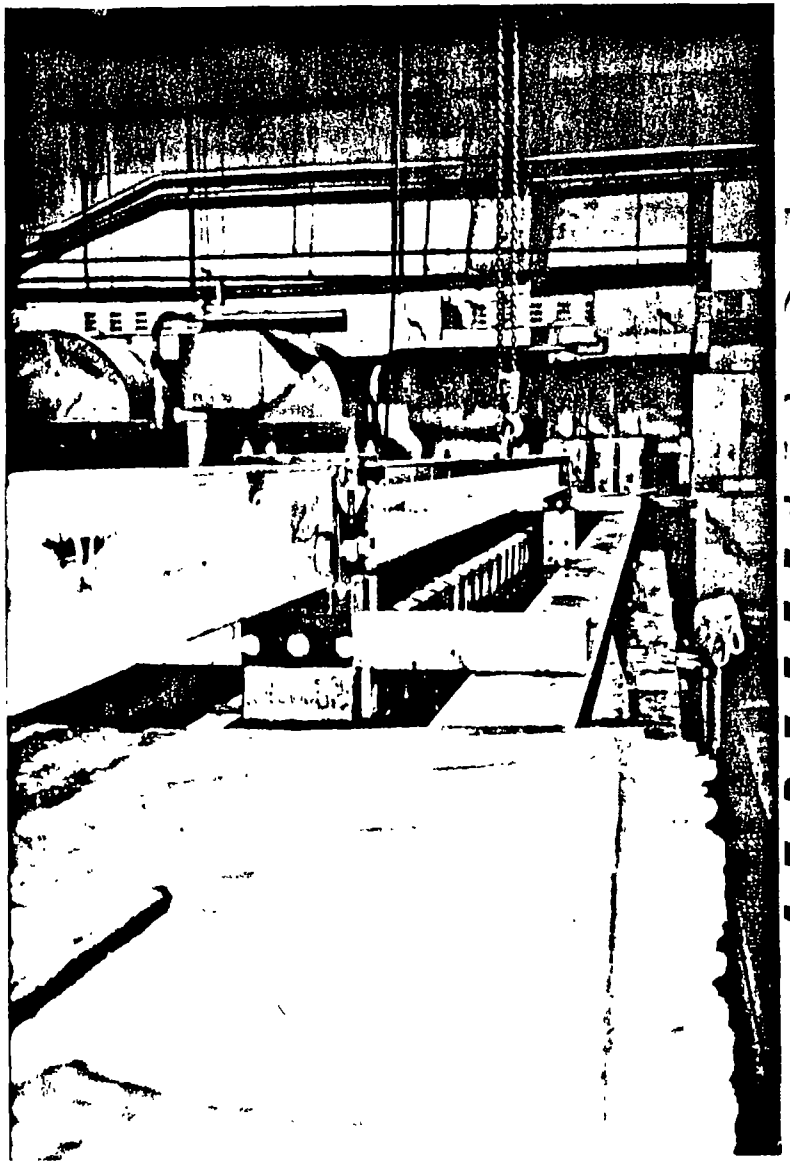
Area	Class	Section

Area	Class	Section

Illinois Environmental Protection Agency Photographs

Site Name: Precision Chrome IEPA #: 0970205001

Date: 10/30/91 Time: 300P Photograph By: MJL



Comments: Chrome plating tank overflow tank

Roll #: 92-139 Photo #: 8, 9

Illinois Environmental Protection Agency Photographs

Site Name: Precision Chrome Site #: 0970205001

Date: 10/30/91 Time: 2000 Photograph By: MJL

Comments: Cooling water discharge, make-up discharge

Roll #: 92-139 Photo #: 10

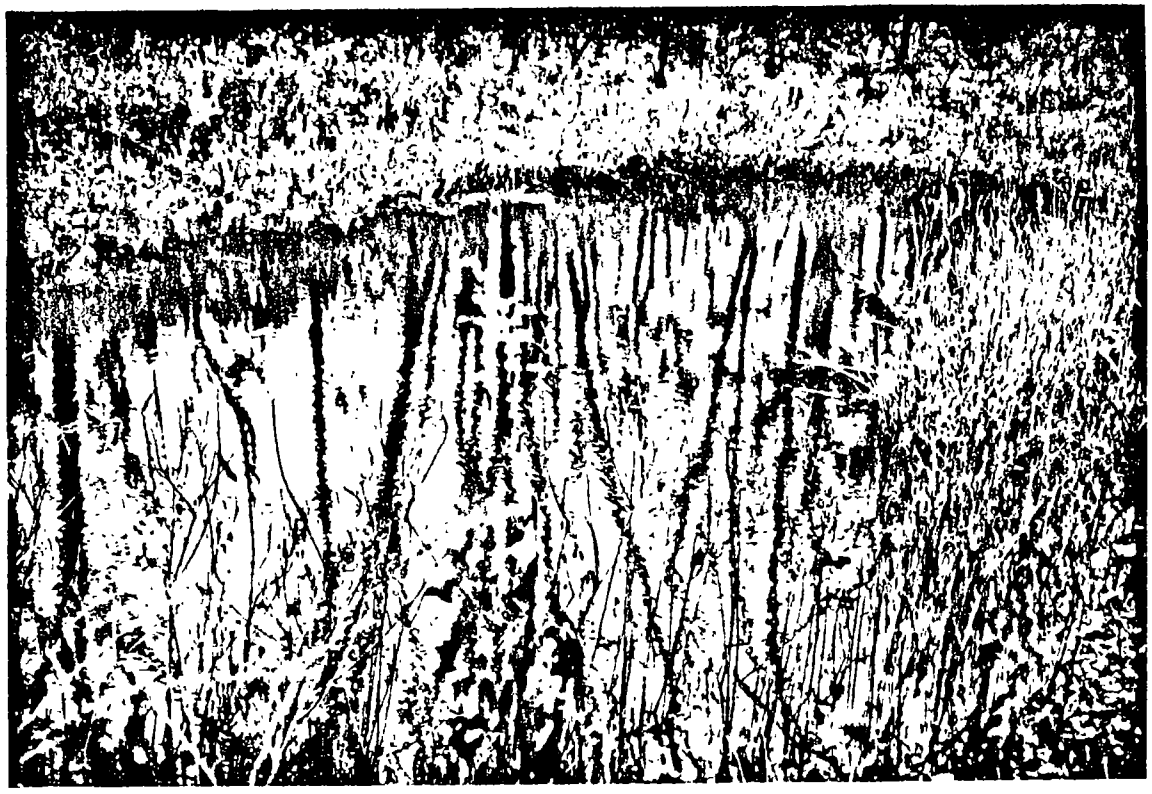
Comments: cooling water pond

Roll #: 92-139 Photo #: 11

Illinois Environmental Protection Agency Photographs

Site Name: Precision Chrome IEPA #: 0970205001

Date: 10/30/91 Time: 2 00P Photograph By: MJL

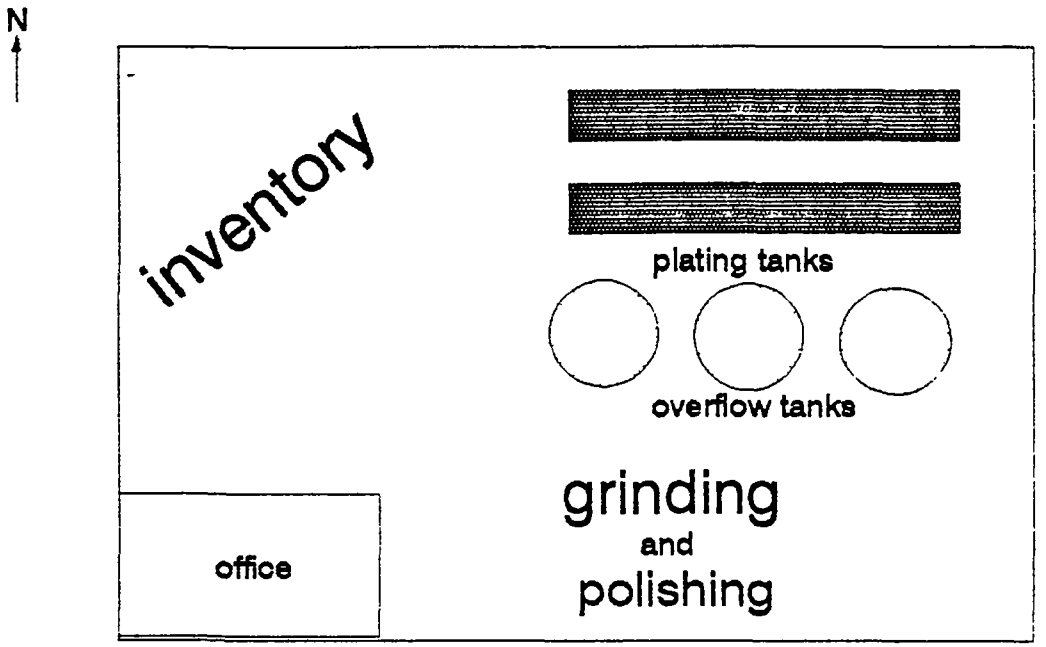


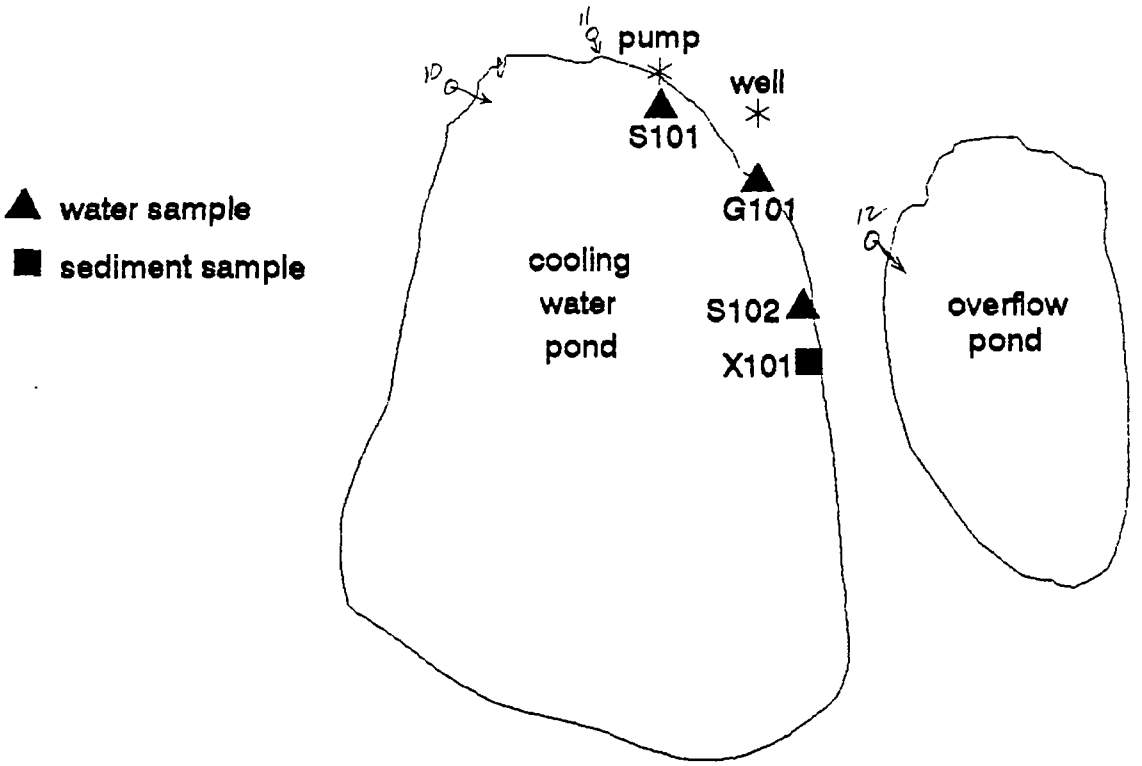
Comments: overflow pond

Roll #: 92-139 Photo #: 12

Reference Number 2

Precision Chrome





Page 1 of 1

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND POLLUTION CONTROL
CHAIN OF CUSTODY

I certify that the samples listed below were collected in my presence and that each sample bottle was sealed intact by me and that I wrote my initials and the date on the seal of each bottle.

Site Inventory No. 0970205021 County Lake

Federal I.D. No. ILD089062871 Precision Chrome (Facility Name)

SAMPLING TEAM

Sample No.	Initials	Consisting of the Indicated No. of Bottles	Date Collected	Time Sealed
X101	MJL	1	10/30/91	230 AM/(PM)
G101	MJL	1	10/30/91	230 AM/(PM)
S101	MJL	1	10/30/91	230 AM/(PM)
S102	MJL	1	10/30/91	230 AM/(PM)
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM
				AM/PM

Sealer's Signature [signature] Date 10/30/91 Time 230 AM/(PM)

Sampler(s) C. R. Kallas [signature]

CARRIERS

I certify I received the above samples, with each seal on each bottle intact and the sealer's initials written on each sample seal.

Relinquished By (Signature)	Date	Time	Received By (Signature)	Date	Time
[signature]	10/30/91	1200 AM/(PM)			AM/PM
		AM/PM	RECEIVED		AM/PM
		AM/PM			AM/PM
		AM/PM	27 NOV 1991		AM/PM
		AM/PM			AM/PM
		AM/PM	IEPA/DLPC		AM/PM
		AM/PM			AM/PM

LAB CUSTODIAN

I certify I received the above samples with each seal on each bottle intact, and the sealer's initials written on each sample seal. After recording these samples in the official record book, these same samples will be in the custody of competent laboratory personnel at all times or locked in a secured area.

Signature R. Modi. Date 10-31-91 Time 12:00 A.M. (P.M.)

Lab Location Chicago. (City)

IL 532-1147
LPC 141 9/83

120-011

Special
Soil Sampling Purpose 1

Waste
Other Program Code LP 41 Unit Code J

Time Collected: 2 pm

Date Collected: 10/30/91

C104121

01 - Special Request
02 - Criminal enforcement
03 - Emergency response
04 - Routine Sampling

Lab # C104121

SPECIAL ANALYSIS FORM

R.M.di

Date Received 10-31-91 12:00 PM

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

SAMPLE# K101

COUNTY:	FILE HEADING:	FILE NUMBER:
Lake	Precision Chrome	0 970205 001

SOURCE OF SAMPLE: (Exact Location)

cooling water pond sediment

PHYSICAL OBSERVATIONS, REMARKS:

TESTS REQUESTED: TCLP Metals

COLLECTED BY: M. & C. Beem TRANSPORTED BY: (initials) M.

LABORATORY

RECEIVED BY:	DATE COMPLETED:	DATE FORWARDED: JAN 09 1992
		James Daugherty

RECEIVED
23 JAN 1992
IEPA/DLPC

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LABORATORIES
2121 WEST TAYLOR STREET
CHICAGO, ILLINOIS 60612

IL 532-0314
LPC 8A 4/77

(NOT FOR DATA PROCESSING)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

AMPLE NUMBER : C104121
AMPLING POINT DESC. : LAKE CO./PRECISION CHROME - X101

SUBMITTING SOURCE # : SITE # : 0970205001
DATE COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

COLLECTED BY : MITCH LEVIN DELIVERED BY : ML
COMMENTS : COOLING WATER POND SEDIMENT
FUNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
SAM TYPE CODE : LPTC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

DATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMO
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

A10000 PH,FINAL TCLP EXT UNITS	: 6.00	A14400 ARSENIC, TCLP	MG/L	: 0.01K
A14500 BARIUM, TCLP	MG/L : 0.4	A14600 CADMIUM, TCLP	MG/L	: 0.005K
A14700 CHROMIUM, TCLP	MG/L : 0.132	A15100 LEAD, TCLP	MG/L	: 0.05K
A15300 MERCURY, TCLP	MG/L : 0.05K	A15500 SELENIUM, TCLP	MG/L	: 0.01K
A15600 SILVER, TCLP	MG/L : 0.005K			

Special
Soil Sampling Purpose ___ C104122

Waste
Other Program Code LP___ Unit Code J

01 - Special Request
02 - Criminal enforcement
03 - Emergency response
04 - Routine Sampling

Time Collected: _____

Lab # C104122 R. Modi

SPECIAL ANALYSIS FORM

Date Collected: 10/30/91

Date Received 10-31-91 12:00 PM

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

SAMPLE# G101

COUNTY:	FILE HEADING:	FILE NUMBER:
Lake	Precision Chrome	0970200501

SOURCE OF SAMPLE: (Exact Location)

make-up well

PHYSICAL OBSERVATIONS, REMARKS:

TESTS REQUESTED: total metals

COLLECTED BY: Chris Kallos TRANSPORTED BY: (initials) MTL

LABORATORY

RECEIVED BY: R. Modi. DATE COMPLETED: DATE FORWARDED: DEC 31 1991

J Dougherty

RECEIVED
23 JAN 1992
IEPA/DLPC

IL 532-0314
LPC 8A 4/77

(NOT FOR DATA PROCESSING)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MPLE NUMBER : C104122
SAMPLING POINT DESC. : LAKE CO./PRECISION CHROME - G101

SUBMITTING SOURCE # : SITE # : 0970205001
DATE COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

COLLECTED BY : CHRIS KALLIS DELIVERED BY : ML
COMMENTS : MAKE-UP WELL WATER
FUNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
SAM TYPE CODE : LPRC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

DATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMO
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

A10000 PH,FINAL TCLP EXT UNITS : ////// : LIQUID SAMPLE WITH <0.5% SOLIDS
: NO EXTRACTION PERFORMED

A14400	ARSENIC, TCLP	MG/L : 0.01K	A14500	BARIUM, TCLP	MG/L : 0.1K
A14600	CADMIUM, TCLP	MG/L : 0.005K	A14700	CHROMIUM, TCLP	MG/L : 1.985
A15100	LEAD, TCLP	MG/L : 0.05K	A15300	MERCURY, TCLP	MG/L : 3CC
A15500	SELENIUM, TCLP	MG/L : 0.01K	A15600	SILVER, TCLP	MG/L : 0.005K

Special
Soil Sampling Purpose ___ C104123 01 - Special Request
02 - Criminal enforcement
Waste
Other Program Code LP 41 Unit Code J 03 - Emergency response
04 - Routine Sampling
Time Collected: 2 pm Lab # C104123
R. Modi.
SPECIAL ANALYSIS FORM
Date Collected: 10/30/91 Date Received 10-31-91 12:00 AM

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

SAMPLE# S101

COUNTY:	FILE HEADING:	FILE NUMBER:
Lake	Precision Chrome	0970205001

SOURCE OF SAMPLE: (Exact Location)

cooling water pump discharge

PHYSICAL OBSERVATIONS, REMARKS:

TESTS REQUESTED: total metals

COLLECTED BY: Chris Kallis TRANSPORTED BY: (initials) ML

LABORATORY

RECEIVED BY: R. Modi. DATE COMPLETED: DATE FORWARDED: DEC 31 1991

J Daugherty

RECEIVED
23 JAN 1992
IEPA/DLPC

IL 532-0314
LPC 8A 4/77

(NOT FOR DATA PROCESSING)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

SAMPLE NUMBER : C104123
SAMPLING POINT DESC. : LAKE CO./PRECISION CHROME - S101

SUBMITTING SOURCE # : SITE # : 0970205001
DATE COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

COLLECTED BY : CHRIS KALLIS DELIVERED BY : ML
COMMENTS : COOLING WATER PUMP DISCHARGE
FUNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
SAM TYPE CODE : LPRC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

DATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMO
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

A10000 PH,FINAL TCLP EXT UNITS : ////// : LIQUID SAMPLE WITH <0.5% SOLIDS
: NO EXTRACTION PERFORMED

A14400 ARSENIC, TCLP	MG/L :	0.01K	A14500 BARIUM, TCLP	MG/L :	0.1K
A14600 CADMIUM, TCLP	MG/L :	0.005K	A14700 CHROMIUM, TCLP	MG/L :	1.575
A15100 LEAD, TCLP	MG/L :	0.05K	A15300 MERCURY, TCLP	MG/L :	@CC
A15500 SELENIUM, TCLP	MG/L :	0.01K	A15600 SILVER, TCLP	MG/L :	0.005K

Special
Soil Sampling Purpose ___ C104124

Waste
Other Program Code LP 41 Unit Code J -

01 - Special Request
02 - Criminal enforcement
03 - Emergency response
04 - Routine Sampling

Time Collected: 2 cap

Lab # C104124 R. modi

SPECIAL ANALYSIS FORM

Date Collected: 10/30/91

Date Received 10-31-91 12.00 pm

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

SAMPLE# S102

COUNTY:	FILE HEADING:	FILE NUMBER:
Lake	Precision Chrome	097020052

SOURCE OF SAMPLE: (Exact Location)

cooling water pond

PHYSICAL OBSERVATIONS, REMARKS:

TESTS REQUESTED: total metals

COLLECTED BY: CLCB falls TRANSPORTED BY: (initials) MTL

LABORATORY

RECEIVED BY: R. modi. DATE COMPLETED: DATE FORWARDED: DEC 31 1991

J Daugherty

RECEIVED
23 JAN 1992
IEPA/DLPC

IL 532-0314
LPC 8A 4/77

(NOT FOR DATA PROCESSING)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

SAMPLE NUMBER : C104124
SAMPLING POINT DESC. : LAKE CO./PRECISION CHROME - S102

SUBMITTING SOURCE # : SITE # : 0970205001
DATE COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

COLLECTED BY : CHRIS KALLIS DELIVERED BY : ML
COMMENTS : COOLING WATER POND
FUNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
SAM TYPE CODE : LPRC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

DATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMO
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

A10000 PH,FINAL TCLP EXT UNITS : ////// : LIQUID SAMPLE WITH <0.5 % SOLIDS
: NO EXTRACTION PERFORMED A14400 ARSENIC, TCLP MG/L : 0.01K
A14500 BARIUM, TCLP MG/L : 0.1K A14600 CADMIUM, TCLP MG/L : 0.005K
A14700 CHROMIUM, TCLP MG/L : 1.580 A15100 LEAD, TCLP MG/L : 0.05K

A15300 MERCURY, TCLP MG/L : @CC A15500 SELENIUM, TCLP MG/L : 0.01K
A15600 SILVER, TCLP MG/L : 0.005K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

SAMPLE NUMBER : C104121
SAMPLING POINT DESC. : LAKE CO./PRECISION CHROME - X101

SUBMITTING SOURCE # : SITE # : 0970205001
DATE COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

COLLECTED BY : MITCH LEVIN DELIVERED BY : ML
COMMENTS : COOLING WATER POND SEDIMENT
FUNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
SAM TYPE CODE : LPTC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

DATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMO
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

A10000	PH,FINAL TCLP EXT	UNITS	: 6.00
A14400	ARSENIC, TCLP	MG/L	: 0.01K
A14500	BARIUM, TCLP	MG/L	: 0.4
A14600	CADMIUM, TCLP	MG/L	: 0.005K
A14700	CHROMIUM, TCLP	MG/L	: 0.132
A15100	LEAD, TCLP	MG/L	: 0.05K
A15300	MERCURY, TCLP	MG/L	: 0.05K
A15500	SELENIUM, TCLP	MG/L	: 0.01K
A15600	SILVER, TCLP	MG/L	: 0.005K

AMPLE NUMBER : C104122
AMPLING POINT DESC. : LAKE CO./PRECISION CHROME - G101

UBMITTING SOURCE # : SITE # : 0970205001
AT COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

OLLECTED BY : CHRIS KALLIS DELIVERED BY : ML
OMMENTS : MAKE-UP WELL WATER
UNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
AM TYPE CODE : LPRC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

ATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMO
AB OBSERVATIONS : TRIP BL SAM# :
UPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

10000 PH,FINAL TCLP EXT UNITS : //////
: LIQUID SAMPLE WITH <0.5% SOLIDS
: NO EXTRACTION PERFORMED
14400 ARSENIC, TCLP MG/L : 0.01K
14500 BARIUM, TCLP MG/L : 0.1K

14600 CADMIUM, TCLP MG/L : 0.005K
14700 CHROMIUM, TCLP MG/L : 1.985
15100 LEAD, TCLP MG/L : 0.05K
15300 MERCURY, TCLP MG/L : @CC

5500 SELENIUM, TCLP MG/L : 0.01K
5600 SILVER, TCLP MG/L : 0.005K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

SAMPLE NUMBER : C104123
SAMPLING POINT DESC. : LAKE CO./PRECISION CHROME - S101

SUBMITTING SOURCE # : SITE # : 0970205001
DATE COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

COLLECTED BY : CHRIS KALLIS DELIVERED BY : ML
COMMENTS : COOLING WATER PUMP DISCHARGE
FUNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
SAM TYPE CODE : LPRC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

DATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMD
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

A10000 PH,FINAL TCLP EXT UNITS : //////
: LIQUID SAMPLE WITH <0.5% SOLIDS
: NO EXTRACTION PERFORMED
A14400 ARSENIC, TCLP MG/L : 0.01K
A14500 BARIUM, TCLP MG/L : 0.1K

A14600 CADMIUM, TCLP MG/L : 0.005K
A14700 CHROMIUM, TCLP MG/L : 1.575
A15100 LEAD, TCLP MG/L : 0.05K
A15300 MERCURY, TCLP MG/L : @CC

A15500 SELENIUM, TCLP MG/L : 0.01K
A15600 SILVER, TCLP MG/L : 0.005K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

SAMPLE NUMBER : C104124
SAMPLING POINT DESC. : LAKE CO./PRECISION CHROME - S102

SUBMITTING SOURCE # : SITE # : 0970205001
DATE COLLECTED : 911030 TIME COLLECTED : 1400 SAMPLING PROGRAM :

COLLECTED BY : CHRIS KALLIS DELIVERED BY : ML
COMMENTS : COOLING WATER POND
FUNDING CODE : LP41 AGENCY ROUTING : CG UNIT CODE :
SAM TYPE CODE : LPRC SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

DATE RECEIVED : 911031 TIME RECEIVED : 1200 RECEIVED BY : RMO
LAB OBSERVATIONS : TRIP BL SAM# :
SUPERVISORS INITIALS : JWD NOTE : K = LESS THAN VALUE

A10000 PH,FINAL TCLP EXT UNITS : //////
: LIQUID SAMPLE WITH <0.5 % SOLIDS
: NO EXTRACTION PERFORMED
A14400 ARSENIC, TCLP MG/L : 0.01K
A14500 BARIUM, TCLP MG/L : 0.1K

A14600 CADMIUM, TCLP MG/L : 0.005K
A14700 CHROMIUM, TCLP MG/L : 1.580
A15100 LEAD, TCLP MG/L : 0.05K
A15300 MERCURY, TCLP MG/L : @CC

A15500 SELENIUM, TCLP MG/L : 0.01K
A15600 SILVER, TCLP MG/L : 0.005K

Reference Number 3

Illinois Environmental Protection Agency
Division of Land Pollution Control

RCRA INSPECTION REPORT

USEPA #: IL D089062871	IEPA #: 0970205001		
Facility Name: PRECISION CHROME INC	Phone #: 708-587-1515		
Street Address: 105 PRECISION RD OFF OF [illegible] ROAD THEN TO [illegible]	County: LAKE		
City: FOX LAKE	State: IL	Zip: 60020	
Region: 2	Inspection Date: 1/24/92	From: 1:30 PM To: 2:00 PM	
Weather: 30°F			

TYPE OF FACILITY

Notified As: D	Regulated As: (T)
LDF? Y HPV? N	90-Day F/U Required?: YES ____ NO ✓

TYPE OF INSPECTION

CEI: ✓ Sampling: ____ Citizen Complaint: ____ Closed: ____ Other: ____

CME/O&M: ____ Record Review: ____ Follow-Up to Inspection of: ____ Withdrawal: ____

NON-REGULATED STATUS

SQG: ____ Claimed Nonhandler: ✓ Other (Specify in Narrative): ____

PART A

Notification Date: 8/15/80, from (initial) or (subsequent) Notification. WITHDRAWN → 11-85

Initial Part A Date: ___/___/___ Amended: ___/___/___

Part A Withdrawal requested: ___/___/___ Approved by (US)(IL) EPA: ___/___/___

PART B PERMIT APPLICATION NA

Part B Permit Submitted: Y or N ___/___/___ Final Permit Issued: ___/___/___

ENFORCEMENT NA

Has the firm been referred to – USEPA: Y or N ___/___/___

Illinois Attorney General: Y or N ___/___/___ County State's Attorney: Y or N ___/___/___

ORDERS ISSUED NA

CACO: ___/___/___ CAFO: ___/___/___ Consent Decree: ___/___/___

Federal Court Order: ___/___/___ State Court Order: ___/___/___ IPCB Order: ___/___/___

TSD FACILITY ACTIVITY SUMMARY

Activity by Process Code	On Part A?	Activity Conducted Prior to 1980?	Was Activity Ever Done?	Closed	Being done at Time of Insp.?	Exempt per 35 IAC, Sec.	On Annual Report 19	19	19
T02	NONE/UNKNOWN		Y	N	N	N		NA	
						RECEIVED			
						20 MAR 1992			
						IEPA/DLPC			

OWNER		OPERATOR	
Name	PRECISION CHROME INC	Name	
Address	105 PRECISION RD	Address	SAME
City	FOX LAKE	City	
State	IL	Zip 60020	State Zip
Phone #	708 587.1515	Phone #	

PERSON(S) INTERVIEWED	TITLE	PHONE #
TOM ALLEN	PLANT MGR	7085871515

INSPECTION PARTICIPANT(S)	AGENCY/TITLE	PHONE #
JAMES HAENNICKE	IEPA/LPS	7085315900

PREPARED BY	AGENCY/TITLE	PHONE #

SUMMARY OF APPARENT VIOLATIONS

Area	Class	Section
CLO	1	725.212(a)
FIN	1	725.242(a)

Area	Class	Section

Area	Class	Section

Precision Chrome Inc
0970205001
1-24-92

NARRATIVE

Precision Chrome utilizes chrome electroplating to coat steel rods used in hydraulics.

HAZARDOUS WASTE GENERATED

Precision Chrome does not generate a regulated hazardous waste. Chromic acid solution is generated at this facility at a rate of approximately 40 drums every 3-4 months. For at least the past 12 years this waste has been sent to a company which meets the special requirements for hazardous waste which is used or re-used per the USEPA.

SITE HISTORY

11-85 Notification withdrawn.

12-85 IEPA samples taken from soil- 150ppm chromium and non-contact cooling water- 6.875ppm chromium. Soil excavated and manifested off-site in May-1986.

02-86 North Shore Sanitary District well sample- 8.2ppm chromium.

04-86 Pond analysis by Precision Chrome- 7.4ppm total chromium; 6.8ppm hexavalent chromium.

07-86 Pond analysis by Precision Chrome- 1.3ppm total chromium; 0.2ppm hexavalent chromium. According to facility President Donald Hjortland and Plant Manager Tom Allen sodium bisulfite was added to the pond to reduce hexavalent chromium content and/or change it to the trivalent configuration.

09-87 IEPA sample taken from well discharge- 8.375ppm chromium.

10-91 IEPA samples taken from well discharge, cooling water discharge, pond, pond sediment- none were found to be hazardous due to chromium.

As a result of a file review this site appears to be regulated as a treatment facility. Although no treatment is currently being done, the surface impoundment (pond) is required to go through closure under RCRA.

VIOLATIONS

725.212(a)- Closure plan needed for surface impoundment

725.242(a)- Cost estimate needed for closure of surface impoundment

Illinois Environmental Protection Agency Photographs

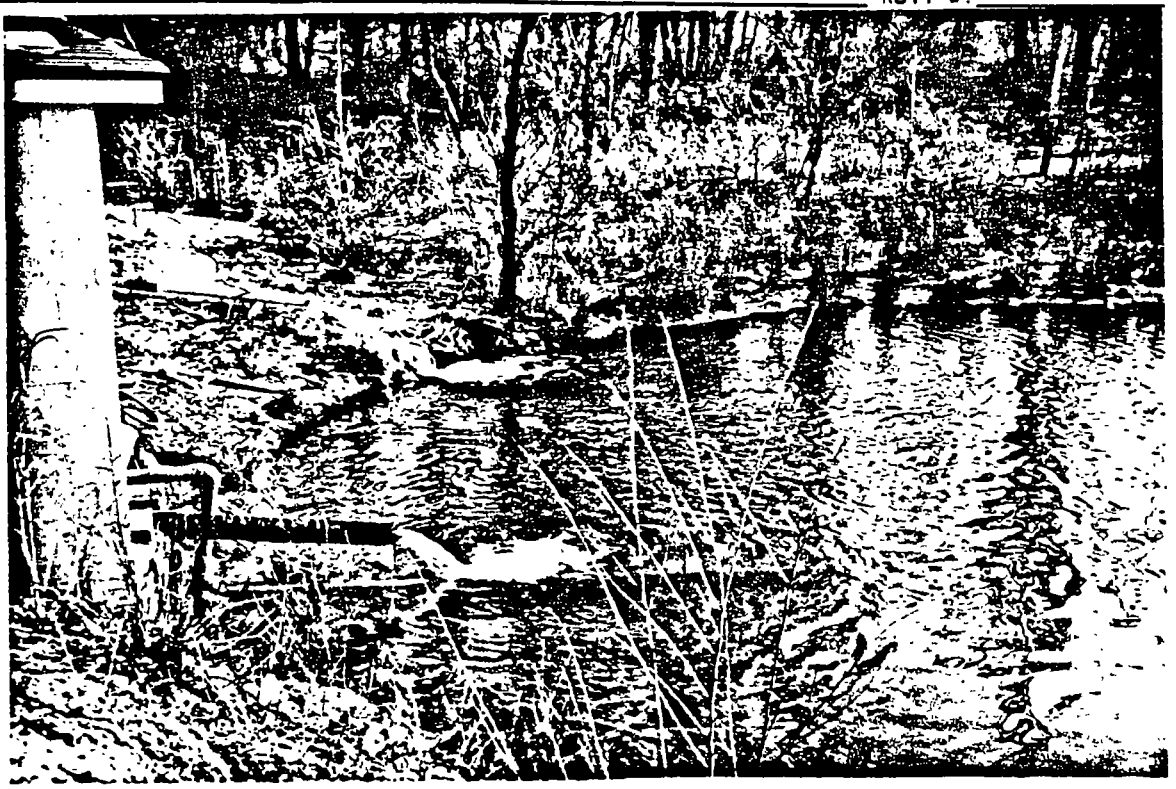
Name: PRECISION CHROME INC Site #: 0970205001

Date: 1-24-92 Time: 130-2 PM Photograph By JAMES HAENNICKE

DID NOT TURN OUT

Comments: E- CHROME PLATING TANKS

Roll #: 92-244 Photo #: 1



Comments: SE- POND (SURFACE IMPOUNDMENT); COOLING WATER +

Area	Class	90 Day F/U Req	Key Ltr / Sub Sec	Requirement	In Apparent Compliance Yes	In Apparent Compliance No	Not Applicable	Remarks or Comment No
				PART 725 **INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES** **Subparts G and H: Closure, Post-Closure and Financial Requirements**				
CLO	1			**Section 725.212: Closure Plan**		✓		NO CLOSURE PLAN FOR SURFACE IMPOUNDMENT
			a	Was the most current facility closure plan available during the inspection? Yes ___ No ✓				
				Was the closure plan submitted to the Agency within the time frames specified below: - At least 180 days prior to the date closure of the first surface impoundment, waste pile, land treatment or landfill unit was (is) expected to begin? Yes ___ No ___ N/A ___ - At least 180 days prior to the date of final closure of a facility with surface impoundment(s), waste pile(s), land treatment or landfill unit(s)? Yes ___ No ___ N/A ___ - At least 45 days prior to the date of final closure of a facility with any tank(s), container storage or incinerator unit(s)? Yes ___ No ___ N/A ___ - At least 60 days prior to the date closure is expected to begin at a facility with a surface impoundment, waste pile, landfill or land treatment unit which also has an approved closure plan? Yes ___ No ___ N/A ___				

IL 532-1502
EPA Form 2580-6 (6-87)

Area	Class	90 Day F/U Req	Key Ltr / Sub Sec	Requirement	In Apparent Compliance? Yes	In Apparent Compliance? No	Not Applicable	Remarks or Comment No
				- No later than 15 days after termination of interim status (unless a full operating permit was issued simultaneously)? Yes ____ No ____ N/A ____				
				- No later than 15 days after issuance of a judicial decree or Board Order to cease receiving hazardous waste or close? Yes ____ No ____ N/A ____				
CLO	1			**Section 725.218: Post-Closure Plan**				
			a	Was the most current facility post-closure plan available during the inspection? Yes ____ No ____ NA				
				Was the post-closure plan submitted to the Agency within the time frames established in this sub-section? Yes ____ No ____ N/A ____				
FIN	1			**Section 725.242: Cost Estimate for Closure**		✓		
				Has the facility prepared a written estimate of the cost of closing the facility?				
FIN	1			**Section 725.244: Cost Estimate for Post-Closure Care**				
				Has the facility prepared a written estimate of the annual cost of post-closure monitoring and maintenance of the facility?				
				NOTE: If no post-closure plan, mark "N/A".				

IL 532-1592
Rev. 2/88 8/87

RCRA LAND DISPOSAL RESTRICTIONS INSPECTION

I. General Information

Facility: PRECISION CHROME INC

U.S. EPA ID No.: ILD089062871 09702O5001

Street: 105 PRECISION RD

City: FOX LAKE State: IL Zip: 60020

Telephone: 708 587 1515

Inspection Date: 12/9/92 Time: 130-2 (am/pm)

Weather Conditions: _____

	Name	Agency/Title	Telephone
Inspectors:	JAMES HAENNICKE	IEPA/EPS	708 5315400
	_____		
Facility Representatives:	TOM ALLEN	PLANT MGR	708 587 1515
	_____		

See Appendix B to determine which of the following LDR waste categories the facility manages:

	Generate	Transport	Treat	Store	Dispose
F001-F005 Solvents	____	____	____	____	____
F020-F023 and F026-F028	____	____	____	____	____
California List*	____	____	____	____	____
First Third [40 CFR 268.10]	____	____	____	____	____
Second Third [40 CFR 268.11]	____	____	____	____	____
Third Third [40 CFR 268.12]	____	____	✓	____	____

* See Appendix A

GEN/TSD/TRANS

INSPECTION SUMMARY

Processes That Generate LDR Wastes:

CHROME PLATING FACILITY

LDR Waste Management:

CONTAMINATION HAS REACHED ON-SITE WELL AND SURFACE IMPOUNDMENT (POND)

POND TREATED IN 7-86 BY ADDITION OF SODIUM BISULFITE TO REDUCE CHROMIUM CONCENTRATION. APPARENTLY THE ONLY TIME TREATMENT HAD OCCURRED

Summary:

Signature: Hammill

Complete the following table:

Waste Code	Receiving Facility
____	_____
____	_____
____	_____

Are appropriate generator notifications and certifications provided to the receiving facility with each waste shipment? [40 CFR 268.7(b)(6)]

Yes ___ No ___

E. **Surface Impoundments [40 CFR 268.4]**

1. Are restricted wastes placed in surface impoundments for treatment? NOT DIRECTLY

Yes ✓ No ___ (If No, go to F.)

List D007

2. Are evaporation or dilution the only recognizable treatment occurring in the surface impoundment? [40 CFR 268.3(a) and 268.4(b)]

Yes ___ No ✓

Comments _____

3. Has the facility submitted to the Agency a waste analysis plan and certification of compliance with minimum technology requirements and ground-water monitoring requirements? [40 CFR 268.4(a)(4)]

Yes ___ No ✓

4. If the minimum technology requirements have not been met, has a waiver been granted for that unit? [40 CFR 268.4(a)(3)(ii)]

Yes ___ No ___ NA ✓

5. Are representative samples of sludge and supernatant from the surface impoundment tested separately, acceptably, and in accordance with the sampling frequency and analyses specified in the waste analysis plan? (Attach test results.) [40 CFR 268.4(a)(2)(i)]

Yes ___ No ✓

6. Does the operating record adequately document the results of waste analyses performed in accordance with 40 CFR 268.4? [40 CFR 264.73(b)(3) and 265.73(b)(3)]

Yes ___ No ___ NA

Comments NO ANALYSES

7. Do the treatment residues (sludges or liquids) exceed applicable treatment standards/prohibition levels? NO ANALYSES

Sludge Yes ___ No ___ Waste Code _____
Supernatant Yes ___ No ___ Waste Code _____

Provide the frequency of analyses conducted on treatment residues:

_____

8. If sludge residues exceed treatment standards/prohibition levels, are they removed on an annual basis? [40 CFR 268.4(a)(2)(ii)]

Yes ___ No ___ NA ✓

Comments _____

Are residues subsequently managed in another surface impoundment? [40 CFR 268.4(a)(2)(iii)]

Yes ___ No ✓

9. If supernatant is determined to exceed treatment standards, is annual throughput greater than impoundment volume? [40 CFR 268.4(a)(2)(ii)]

Yes ___ No ___ NA ✓

Comments _____

F. Land Disposal

1. Are restricted wastes placed in or on the land in units such as landfills, surface impoundments*, waste piles, land treatment units, salt domes/beds, mines/caves, concrete vaults, or bunkers? [40 CFR 268.2(c)]

Yes ___ No ___ (If No, go to G.)

*Note: Do not include surface impoundments addressed in E.

If yes, specify which units and what wastes each unit has received:

Unit	Waste
_____	_____
_____	_____
_____	_____

2. Does the facility, in accordance with an acceptable waste analysis plan, test prohibited wastes prior to land disposal to ensure that all applicable treatment standards and/or prohibition levels have been met? [40 CFR 268.7(c)(2)]

Yes ___ No ___

Comments _____

STATE OF ILLINOIS 1975
DEPARTMENT OF REGISTRATION AND EDUCATION

Handbook Of Illinois Stratigraphy

H. B. Willman
Elwood Atherton
T. C. Buschbach
Charles Collinson
John C. Frye
M. E. Hopkins
Jerry A. Lineback
Jack A. Simon

BULLETIN 95

ILLINOIS STATE GEOLOGICAL SURVEY

URBANA, ILLINOIS 61801

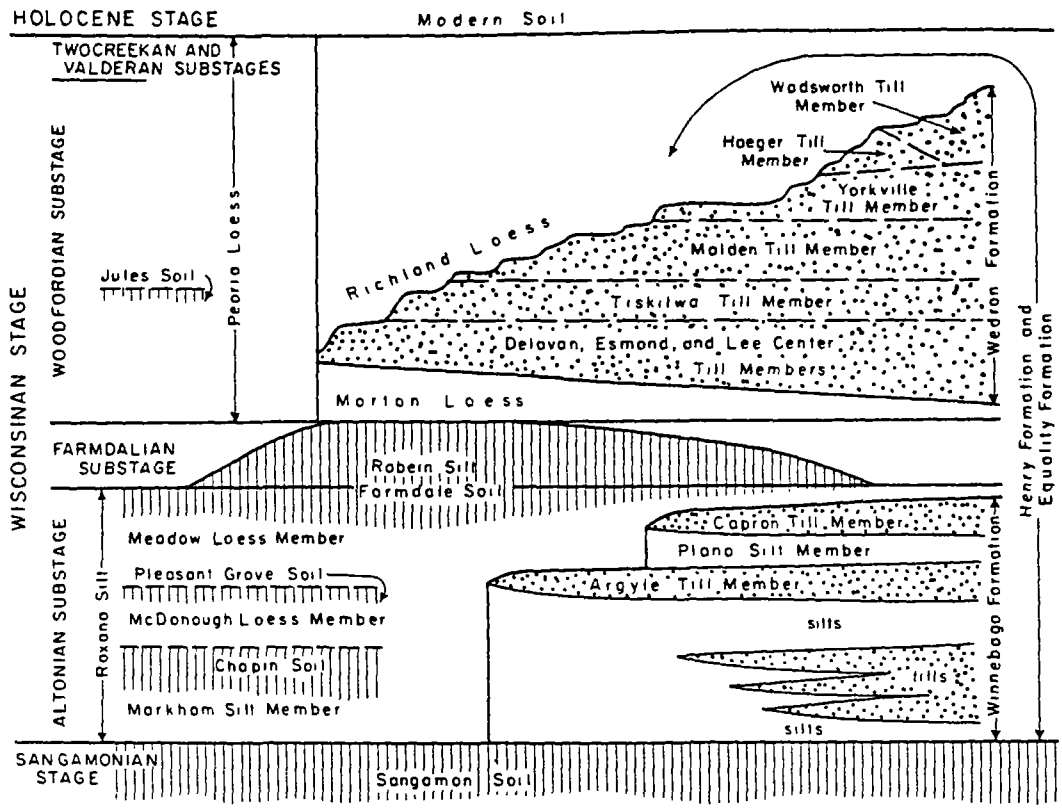


Fig. Q-8—Diagrammatic cross section showing the relations of the formations and members of Wisconsinan age in northern and western Illinois (Willman and Frye, 1970).

Stage was proposed in 1968 (Frye et al., 1968b, p. E1). The Wisconsinan Stage is bounded at the base by the contact of the Roxana Silt on the top of the Sangamon Soil (approximately 75,000 radiocarbon years B.P. [Frye et al., 1974a, p 12]), and at the top by the contact of the youngest glacial tills with overlying lacustrine deposits in northeastern Wisconsin (approximately 7000 radiocarbon years B. P. [Frye and Willman, 1970, p. 126]). The Cottonwood School Section in Cass County (cen. E line 11, 18N-11W) was suggested by Willman and Frye (1970, p. 121) as a paratype for the stage in Illinois. The Wisconsinan Stage is subdivided into five substages, and the deposits are differentiated into 16 formations, but six of them are dominantly Holocene in age (figs. Q-4, Q-8). The Wisconsinan Stage is represented in all parts of Illinois.

Altonian Substage

The Altonian Substage (Frye and Willman, 1960, p. 5), the oldest subdivision of the Wisconsinan Stage, is named for Alton, Madison County, and the type section, which consists of Roxana Silt, is in the Alton Quarry Section (SE SW NE 10, 5N-10W) (Leonard and Frye, 1960, p. 24). In the type locality the base of the Altonian Substage is at the contact of the Markham Silt Member of the Roxana Silt with the top of the Sangamon Soil. The top of the Altonian is the contact of the Robein Silt and the Roxana Silt, or the top of the Farmdale Soil developed in Roxana Silt. Elsewhere in Illinois the substage includes deposits of till (Winnebago Formation), outwash (Henry Formation), and lacustrine deposits (Equality Formation). Deposits of Altonian age are widely distributed over Illinois.

Roxana Silt

The Roxana Silt (Frye and Willman, 1960, p 5) is named for Roxana, Madison County, and the type section is the Pleasant Grove School Section in the bluff of the Mississippi River Valley (SW NE SE 20, 3N-8W) (fig Q-1C) The formation rests on the top of the Sangamon Soil (developed in Teneriffe Silt or older deposits), and it terminates upward at the base of the Robein Silt or the top of the in-situ Farmdale Soil (developed in the Roxana), which is overlain by Peoria Loess The Roxana Silt and the overlying Robein Silt were called Late Sangamon Loess in early reports and later named Farmdale Loess and assigned to the Wisconsin Stage (Leighton, *in* Wascher et al , 1948, Leighton and Willman, 1949, 1950) The member is largely loess, but it contains some colluvium at the base and locally some eolian sand It is pinkish tan to yellow-gray (Frye et al , 1962) and has a distinctive mineral composition (Glass et al , 1968) It is 48 feet thick in the type section, but it thins rapidly back from bluff exposures Where thick, it contains a distinctive molluscan fauna (Leonard and Frye, 1960), and it has been subdivided into three members, the Markham Silt Member at the base, the McDonough Loess Member, and the Meadow Loess Member Where the Roxana is thinner than 7-8 feet thick the members generally cannot be differentiated because of pedological alteration (figs Q-1A, E) Even where only a foot or two thick, it is generally darker brown and more clayey than the Peoria Loess The formation occurs extensively outside the limits of Woodfordian glaciation and locally is found buried by Woodfordian drift

Markham Silt Member—The Markham Silt Member of the Roxana Silt (Willman and Frye, 1970 p 62) is named for the town of Markham, 4 miles west of Jacksonville, Morgan County, and the type section is in the Chapin Section (SW NE NW 8 15N-11W) The unit generally consists of colluvium of silt with some sand and a few small pebbles (Frye et al , 1974a), but locally it may be entirely silt or sand It rests on the top of the Sangamon Soil or on an erosional surface truncating the Sangamon Soil, and it is terminated at the top by the top of the Chapin Soil, which is overlain by the McDonough Loess Member The Markham is gray-brown, lies within the profile of the Chapin Soil, is commonly 1-3 feet thick, and is widely present in western and central Illinois

McDonough Loess Member—The McDonough Loess Member of the Roxana Silt (Willman and Frye, 1970, p 62) is named for McDonough Lake on the Mississippi River floodplain in Madison County, and the type section is in the Pleasant Grove School Section, the same as for the formation (fig Q-1C) The member consists of gray to tan loess, commonly leached, bounded at the base by the top of the Chapin Soil or older deposits and at the top by the top of the Pleasant Grove Soil, which is overlain by the Meadow Loess Member The member is generally recognizable only in the thick loess deposits adjacent to the major valleys of central, southern, and western Illinois, and it is 5 feet or less thick

Meadow Loess Member—The Meadow Loess Member of the Roxana Silt (Willman and Frye, 1970, p 63) is named for Meadow Heights, part of Collinsville, Madison County, and the type section, like that of the formation, is in the Pleasant Grove School Section (fig Q-1C) The member is loess, and where thick along the bluffs of the Illinois and Mississippi Rivers of central and southern Illinois it has three recognizable zones—pink-tan zones at the top and base and a gray-tan zone in the middle Where thick and calcareous, it contains a distinctive fauna of fossil mollusks that has been radiocarbon dated at several localities (Leonard and Frye, 1960) Its heavy mineral suite and clay mineral composition differ from those of other loess deposits (Frye et al , 1962) It rests on top of the Pleasant Grove Soil developed in the McDonough Loess Member, or on older deposits, and it is bounded at the top by the in-situ Farmdale Soil, by the Robein Silt, or by younger formations The member is 43 feet thick at its type locality, but it thins to a few feet at distances of 15 miles or more from the source valleys

Chapin Soil

The Chapin Soil (Willman and Frye, 1970, p 86) is named for Chapin, Morgan County, and the type section is in the Chapin Section (SW NE NW 8, 15N-11W) It is an in-situ soil developed in the colluvium and silt of the Markham Silt Member of the Roxana Silt The soil generally is grayish brown and rests either on the A-horizon of the Sangamon Soil or on a truncated Sangamon Soil. The profile rarely is more than 2 feet thick, in contrast to the thicker Sangamon profile below (Frye et al , 1974a) The Chapin Soil occurs in western and central Illinois

Pleasant Grove Soil

The Pleasant Grove Soil (Willman and Frye, 1970, p 87) is named for Pleasant Grove School and the type section, like that of the Roxana Silt, is in the Pleasant Grove Section, Madison County The soil at the type locality is an immature, or A-C, profile developed in silt of the McDonough Loess Member of the Roxana Silt The solum is generally gray to gray-brown and lacks a textural B-horizon The soil has been observed only adjacent to the major valleys of central and western Illinois

Winnebago Formation

The Winnebago Formation (Frye and Willman, 1960, p 5, Frye et al , 1969, p 25) is named for Winnebago County, and the type section is on the east side of Rockford in the Rock Valley College Section (SW NW SW 10, 44N-2E) and in cores of near-by borings (Nos. 2 and 5) on the Northwest Tollway (Kempton, 1963) The name Winnebago was introduced as a replacement for the term "Farmdale" (Shaffer, 1956) The formation includes glacial till and intercalated silt, gravel, and sand It is subdivided into three named members, the Argyle Till Member at the base, the Plano Silt Member, and the Capron Till Member, which overlie unnamed till, sand, and gravel members that occur in the buried valleys and are not exposed The formation is bounded below by the top of the Sangamon Soil, and at the top by the top of the in-situ Farmdale Soil It ranges from a few feet to as much as 400 feet thick where it is the filling of deep bedrock valleys The formation is exposed at the surface only in central northern Illinois (fig Q-5) The Lemont drift (Bretz, 1955), tentatively assigned to this formation, is discussed with the Valparaiso Drift

Argyle Till Member—The Argyle Till Member of the Winnebago Formation (Frye et al., 1969, p 26, Willman and Frye, 1970, p 63) is named for Argyle, Winnebago County, and the type section is in the Rock Valley College Section, the same as the type section for the formation The till is exceptionally sandy, pinkish tan or salmon colored, massive, and calcareous It is overlain by the Plano Silt Member, and it overlies unnamed silts and tills of the Winnebago Formation It occurs only in central northern Illinois (fig Q-5)

Plano Silt Member—The Plano Silt Member of the Winnebago Formation (Kempton and Hackett, 1968, p 31, Willman and Frye, 1970, p 64) is named for Plano, Kendall County, and the type section is in the Big Rock Creek Section (SE NE 1, 37N-6E) where the member is 7 feet thick The member consists of silt, silt rich in organic material, and peat It overlies the Argyle Till and underlies the Capron Till, and it is recognized only in the area where the Capron Till is present

Capron Till Member—The Capron Till Member of the Winnebago Formation (Frye et al , 1969, p 26, Willman and Frye, 1970, p 64) is named for Capron, Boone County, and the type section is in the Capron North Section (NE SE SE 23, 46N-4E) Its upper part is gray, calcareous sandy till and the lower part is silty till It rests on Plano Silt or Argyle Till and is topped by an immature soil profile (Farmdale Soil) overlain by Peoria Loess It occurs only in central northern Illinois (fig Q-5)

Henry Formation

The Henry Formation (Willman and Frye, 1970, p 70) is named for Henry, Marshall County, and the type exposure is in a gravel pit along Illinois Highway 29, 2 miles north of Henry (SE SE 32, 14N-10E), where 30 feet of sand and gravel overlain by 2 feet of the Richland Loess and the Modern Soil are exposed The formation consists of glacial outwash of sand and gravel In places it contains a few thin silt beds The thickness of the formation varies greatly, in the major valleys it locally exceeds 100 feet The formation rests on Woodfordian or older rocks, and it is overlain by Richland or Peorian Loess, the Equality Formation, or Holocene deposits Although in some areas the formation is continuous with sand and gravel deposits that interfongue with tills of the Winnebago and Wedron Formations, vertical cut-offs are used to put the tongues in the Wedron or Winnebago Formations, and the Henry Formation is never overlain by till (fig Q-8). Ideally, the formation is bounded at the base by the top of the Sangamon Soil, but such exposures are rarely observed, in some valleys it contains deposits older than Wisconsinan in its lower part The formation is subdivided into three members, which are genetic units that differ in lithology—the Batavia Member (outwash plains), the Mackinaw Member (valley trains), and the Wasco Member (ice-contact deposits) .The Henry Formation occurs extensively in the area of Wisconsinan glaciation and beyond that area along the outwash-carrying valleys (fig. 11).

Batavia Member—The Batavia Member of the Henry Formation (Willman and Frye, 1970, p 71) is named for Batavia, Kane County, and the type exposure is in a gravel pit, 8 miles north of Batavia (SW 1, 40N-8E), in outwash deposited in front of the West Chicago Moraine The Batavia Member is an upland unit of outwash sand, gravel, and silt, largely deposited along the fronts of many Wisconsinan moraines in discontinuous sheet-like deposits The member rarely exceeds 30 feet thick, and it has sharp local variations in both thickness and texture It rests on units of the Wedron Formation, or older deposits, and is commonly overlain only by a few feet of Richland Loess It occurs in and bordering the area of Wisconsinan glaciation

Mackinaw Member—The Mackinaw Member of the Henry Formation (Willman and Frye, 1970, p 71) is named for Mackinaw, Tazewell County, and the type section is in a gravel pit on the southwest side of Mackinaw (NE NW 19, 24N-2W). The member consists of sand, pebbly sand, and gravel deposited as outwash valley trains leading outward from Wisconsinan glacier fronts and now preserved in terraces and beneath Holocene deposits The materials are well sorted and regularly bedded At the type locality the member is 30 feet thick, but at places it is more than 100 feet thick. The member rests on rocks ranging from the Wedron Formation to Paleozoic bedrock It is generally overlain only by thin Richland Loess in the area of Wisconsinan glaciation and by the Peoria Loess outside that area It occurs along many valleys throughout Illinois (fig Q-2)

Wasco Member—The Wasco Member of the Henry Formation (Willman and Frye, 1970, p 72) is named for Wasco, Kane County, and the type section is in a gravel pit along the Chicago Great Western Railroad (SE NW 24, 40N-7E) The Wasco consists of ice-contact sand and gravel, largely in kames, eskers, and deltas, and is characterized by lateral and vertical variations in grain size, sorting, bedding, and structure At some localities the deposit is largely cobbles and boulders Lenses of till and beds of silt occur in some deposits The thickness varies greatly The member generally rests on the Wedron Formation but locally overlies older deposits It is commonly overlain by thin Richland Loess It occurs discontinuously throughout the area of Wisconsinan glaciation

Equality Formation

The Equality Formation (Willman and Frye, 1970, p 72) is named for Equality, Gallatin County, and the type section is in the Saline River Section (SE cor SW 27, 9S-7E) The formation consists of lacustrine silt, clay, and sand underlying a lake plain or beach complex of the present land surface It was deposited during Wisconsinan time in (1) slackwater lakes, principally in valleys tributary to the Mississippi, Wabash, and Ohio Rivers in southern Illinois, (2) in shallow lakes produced by flooding between moraines, and (3) in ice-front lakes in northern Illinois (fig 11). The formation is subdivided into the Carmi Member, dominantly silt and clay, and the Dolton Member, dominantly sand It includes deposits of Altonian and Woodfordian age Extensive molluscan faunas have been described from the lacustrine deposits (Frye et al., 1972) In the type region, the thickest sequence of Equality deposits available for study was 52 feet in the Equality Northeast Section (Frye et al , 1972), but well logs suggest that the formation may exceed 100 feet locally The formation rests on Woodfordian or older deposits and its top is at the surface, except in local areas where Holocene formations cover it In southern Lake Michigan it is overlain by the Lake Michigan Formation Many individual glacial lakes, shorelines, spits, bars, and beaches have been named, but they are not stratigraphic units (Willman and Frye, 1970)

Carmi Member—The Carmi Member of the Equality Formation (Willman and Frye, 1970, p 74) is named for Carmi, White County, and the type section is an exposure along Crooked Creek 4 miles north of Carmi (NE cor SW 21, 4S-10E) The type section of this member occurs in the deposits of glacial Lake Little Wabash However, the deposits, their fauna, and clay mineral composition have been much more intensively studied in the deposits of Lake Saline in Gallatin County to the south (Frye et al., 1972) The deposits there are clay and silt, with some sand, commonly 20-40 feet thick but locally as much as 100 feet They partially fill, or drown, an extensive system of valleys that were dammed by aggradation of the Ohio and Wabash Valleys The Carmi occurs throughout the state in large areas covered by Wisconsinan lakes and also in many smaller areas in the region of Wisconsinan glaciation in northern Illinois

Dolton Member—The Dolton Member of the Equality Formation (Willman and Frye, 1970, p 74) is named for Dolton, Cook County, and the type section is an exposure of 8 feet of sand at the top of a clay pit (S½ NE 3, 36N-14E). The Dolton is dominantly sand with local beds of silt and gravel, and most of it was deposited in beaches and bars It is differentiated only where it is the surficial deposit of the Equality Formation It is best developed in Cook County, where it is associated with the several beaches of Lake Chicago (Bretz, 1955)

Farmdalian Substage

The Farmdalian Substage (Leighton and Willman, 1950, p 602; Frye and Willman, 1960, p. 6) is named for Farmdale, Tazewell County, and the type section is in the Farm Creek Section (NE SW SE 30, 26N-3W). The substage was defined in more detail in 1968 (Frye et al., 1968b, p E15) and in 1970 (Willman and Frye, p 125) The substage includes the deposits made during the span of time represented by the Robein Silt at the type section (28,000-22,000 radiocarbon years B.P.), where the Robein Silt overlies the Roxana Silt and is terminated upward by the top of the Farmdale Soil. It is overlain by the Morton Loess. The substage also comprises the Peddicord Formation and the Farmdale Soil. The deposits have been extensively radiocarbon dated in Illinois

Robein Silt

The Robein Silt (Willman and Frye, 1970, p 64) is named for Robein, Tazewell County, and the type section is in the Farm Creek Section (NE SW SE 30, 26N-3W) (fig Q-1B) It was called Farmdale Silt in some reports (Frye and Willman, 1960) The Robein is brown, gray, dark gray to black, leached silt It contains abundant organic material, which differentiates it from the Roxana Silt below It is part of the Farmdale Soil and is Farmdalian in age. It rests on the Roxana Silt, the Peddicord Formation, or the Winnebago Formation, and it is overlain by the Peoria Loess, Morton Loess, or the Wedron Formation The Robein ranges from a few inches to more than 5 feet thick It is discontinuous but widely distributed in Illinois.

Peddicord Formation

The Peddicord Formation (Willman et al., 1971, p 4) is named for Peddicord School, La Salle County, and the type section is in the Wedron Section (SE SW 9, 34N-4E) (Willman and Frye, 1970) (fig Q-1B) The formation consists of gray and pinkish tan, calcareous, lacustrine silts, and it contains fossil mollusks (Leonard and Frye, 1960) It is Farmdalian in age The formation has been observed only in the upper Illinois Valley, where it overlies the Sangamon Soil or bedrock and is overlain by the Robein Silt or the Wedron Formation

Farmdale Soil

The Farmdale Soil was named for Farmdale, Tazewell County (Willman and Frye, 1970, p 87), and the type section is in the Farm Creek Section (NE SW SE 30, 26N-3W). In the type section it is an organic soil represented by the Robein Silt. It is brown to black and lacks a textural B-horizon This unit occurs widely over Illinois and occurs both as an organic soil and as an in-situ profile developed in Roxana Silt It is overlain by the Morton Loess, by the Peoria Loess, or by the Wedron Formation

Woodfordian Substage

The Woodfordian Substage (Frye and Willman, 1960, p. 6-7) is named for Woodford County, Illinois, where it is the surface deposit over nearly the entire county Glaciers of the Lake Michigan and Erie Lobes (figs. Q-9, Q-10) covered northeastern Illinois during Woodfordian time. The substage is based on the sequence of deposits above the contact of the Morton Loess on the Robein Silt in the type locality of those formations and extending upward to the base of the Two Creeks deposits, as typically exposed in east-central Wisconsin (Thwaites and Bertrand, 1957; Frye et al., 1968b). The substage includes the deposits of six formations, as well as parts of several dominantly Holocene formations (figs Q-4, Q-8). Two of the six formations (Henry and Equality) include earlier Wisconsinan deposits and were described under the Altonian Substage. The molluscan fauna of the Woodfordian Substage, largely from the Peoria Loess, has been described (Leonard and Frye, 1960) Many radiocarbon dates have been determined from several deposits of the substage, including those adjacent to the lower and upper contacts, and they indicate a time span from 22,000 to 12,500 radiocarbon years B.P The Woodfordian includes deposits that earlier were assigned to the Iowan, Tazewell, Cary, and Mankato Substages (fig. Q-6).

Peoria Loess

The Peoria Loess (Leverett, 1898a, p 246, Kay and Leighton, 1933, p. 673) is named for Peoria, Peoria County, from exposures in the bluffs of the Illinois River Valley The term "Peorian" was first used by Leverett (1898a) for an interglacial stage Kay and Leighton (1933) restricted Peorian to the loess deposits outside the Shelbyville Moraine System, as is still the practice Frye and Leonard (1951, p. 128) made it a rock-stratigraphic unit—Peoria Loess—which use subsequently was adopted in Illinois (Frye and Willman, 1960, p 7). As a type section had not been described, Willman and Frye (1970, p. 65-66, 188-189) designated the Tindall School Section, south of Peoria in the west bluff of the Illinois Valley, as the type section (SW SW NE 31, 7N-6E). The formation consists of massive, well sorted silt, ranging from coarse in the valley bluffs to fine in uplands distant from the bluffs It locally contains some fine to medium sand in the bluff areas. Where thick it is calcareous, except in the Modern Soil profile at the top, where thin it is all noncal-

careous The zone from which carbonates are leached varies from 3-4 feet thick at the northern end of the state to 15-20 feet at the southern end In thick sections along the Illinois Valley, the Jules Soil occurs in the upper part, several feet below the Modern Soil The Peoria Loess ranges in thickness from as much as 100 feet to only a foot or two, thinning away from the bluffs (figs 11, Q-1C) (Smith, 1942, Willman and Frye, 1970) The fossil mollusks (Leonard and Frye, 1960) and clay mineral composition (Frye et al., 1962, 1968a) have been described, and a group of radiocarbon dates indicate a span of time from approximately 22,000 B P to 12,000 B.P Peoria Loess is physically continuous with both the Morton Loess and the Richland Loess (fig Q-8), which occur within the area of Woodfordian glaciation The Peoria Loess occurs on the upland areas and valley walls of nearly all of Illinois outside the area of Woodfordian glaciation

Morton Loess

The Morton Loess (Frye and Willman, 1960, p 7) is named for Morton, Tazewell County, and the type section is in the Farm Creek Railroad-cut Section (cen 31, 26N-3W) (fig Q-1A) The unit was formerly called Peorian loess (Alden and Leighton, 1917) and later Iowan loess (Leighton, 1933, Leighton and Willman, 1950) It occurs above the Robein Silt or the Farmdale Soil developed in Roxana Silt and lies below the Wedron Formation It is massive, calcareous silt, gray to gray-tan and locally fossiliferous (Leonard and Frye, 1960) It ranges up to 10 feet thick It occurs only within the area of Woodfordian glaciation, but it is physically continuous with the lower part of the Peoria Loess, which lies outside that area (fig Q-8). Radiocarbon dates indicate a time span from 20,000 to 22,000 years B P

Wedron Formation

The Wedron Formation (Frye et al , 1968b, p E16) is named for Wedron, La Salle County, and the type section is in the Wedron Section (fig Q-1B) in the Wedron Silica Company pit (SE SW 9, 34N-4E) (Willman and Payne, 1942, p 148, 307, Willman and Frye, 1970, p 190) The formation consists of those deposits of glacial till and outwash that extend upward from their contact on the Morton Loess to the top of the till below the Two Creeks deposits at Two Creeks, Wisconsin (Thwaites and Bertrand, 1957). Although largely till, the Wedron contains numerous intercalated beds of outwash gravel, sand, and silt (fig Q-1A, B) In Illinois the formation is subdivided into 12 members (fig Q-4) on the basis of the lithology of successive sheets of till Before 1968, the deposits included in the Wedron Formation were subdivided into drifts or drift formations, lithologically distinct units named for the moraine marking the outer margin of the particular drift (Culver, 1922a, Fisher, 1925, Willman and Payne, 1942, Frye et al , 1965) The gray silty till of the Esmond, Lee Center, and Delavan Till Members was the Shelbyville drift; the pink sandy till of the Tiskilwa Till Member was the Bloomington drift, the yellow-gray silty to sandy till of the Malden Member was the Normal and Cropsey drifts, the medium to dark gray clayey till of the Yorkville Till Member was the Marseilles and Minooka drifts, and the yellow-gray gravelly to clayey till of the Haeger and Wadsworth Till Members was the Valparaiso and Lake Border drifts The youngest, or uppermost, beds of the Wedron do not occur in Illinois but are exposed in eastern Wisconsin The formation spans all but the earliest part of the Woodfordian Substage of the Wisconsinan Stage Its thickness ranges widely, up to as much as 250 feet Approximately 60 feet of deposits is exposed in the type section The formation is widely distributed in the northeast quadrant of Illinois (fig Q-5), where it includes most of the materials of the many prominent Woodfordian moraines, which are described as drift units in the section on morphostratigraphic classification (fig Q-10)

Esmond Till Member—The Esmond Till Member of the Wedron Formation (Frye et al , 1969 p 26, Willman and Frye, 1970, p 67) is named for Esmond, De Kalb County The type section is in roadcuts 10 miles north of Esmond (NW SW NW 27, 43N-2E, Winnebago County) and borings at Greenway School, near Esmond The upper part of the till is silty, but the lower part is more clayey It is gray and calcareous, and its clay mineral content is characterized by being exceptionally high in illite The member overlies the Morton Loess, or the sandy Argyle Till Member of the Winnebago Formation where the Morton is absent It is overlain by the pink-tan deposits of the Tiskilwa Till Member of the Wedron Formation or by Richland Loess It is discontinuous, rarely exceeds 25 feet thick, and it is the surface drift only in the Dixon Sublobe in north-central Illinois (figs Q-5, Q-9)

Lee Center Till Member—The Lee Center Till Member of the Wedron Formation (Frye et al 1969, p 26, Willman and Frye, 1970, p 68) is named for Lee Center, Lee County, and the type section is a roadcut 5 miles northwest of Lee Center (SE SW NW 31, 21N-10E) In the type section it consists of 8 feet of calcareous, gray, silty till that underlies 4 feet of leached, brown silt of the Richland Loess The Lee Center Till is bounded at the top by the sharply contrasting pink-tan Tiskilwa Till Member It overlies the Morton Loess It occurs primarily in the Green River Sublobe (figs Q-5, Q-9), where it is thin, discontinuous, and extensively eroded by the meltwaters of Woodfordian glaciers

Delavan Till Member—The Delavan Till Member of the Wedron Formation (Willman and Frye, 1970, p 68) is named for Delavan, Tazewell County, and the type section is in roadcuts along Illinois Highway 121, 4 miles east of Delavan (SW 16, 22N-3W) The member consists of gray, calcareous, silty, illitic till that attains a maximum thickness of about 200 feet in the Shelbyville Moraine System It overlies the Morton Loess and is overlain by the distinctive pinkish tan till of the Tiskilwa Till Member It is judged to be equivalent to the Lee Center and Esmond Till Members farther north Beyond the limit of the Tiskilwa Till Member, the Delavan is overlain by Richland Loess It occurs in the Peoria Sublobe and is best exposed in Tazewell and McLean Counties (figs Q-1A, Q-5)

Tiskilwa Till Member—The Tiskilwa Till Member of the Wedron Formation (Willman and Frye 1970, p 68) is named for Tiskilwa, Bureau County, and the type section is the Buda East Section (SE SE SW 31, 16N-8E) The till is sandy, pink-tan to reddish tan-brown, and commonly is 100-150 feet thick in the higher parts of the Bloomington Moraine System It is bounded above by the more illitic, tan to yellow-gray till of the Malden Till Member, and below by the gray till of the Delavan, Lee Center, or Esmond Till Members It is one of the most extensive members of the Wedron Formation, extending from Bloomington in McLean County northward to the Wisconsin state line (fig Q-5)

Malden Till Member—The Malden Till Member of the Wedron Formation (Willman and Frye, 1970, p 69) is named for Malden, Bureau County, and the type section is in the Malden South Section (SW SE SE 5, 16N-10E) The member consists of silty and sandy, yellow-gray to gray-tan till, with discontinuous beds and lenses of gravel and sand In some

areas it grades upward to clayey till It is bounded at the base by the Tiskilwa Till Member and is overlain by the clayey Yorkville Till Member or, where the Malden Member is the surface drift, by the Richland Loess At the type locality the member is 25 feet thick, but it is 50-100 feet thick under the crests of some moraines It is extensively exposed from McLean County northward to Kane County (fig Q-5)

Yorkville Till Member—The Yorkville Till Member of the Wedron Formation (Willman and Frye, 1970, p 69) is named for Yorkville, Kendall County, and the type section is in roadcuts at the intersection of Illinois Highways 47 and 71, 1 mile south of Yorkville (SE SE SE 5, 36N-7E) The member is a clayey, greenish gray to dark gray till characterized by abundant small dolomite pebbles The Yorkville Member is as much as 200 feet thick in the Marseilles Morainic System, in and east of which it is extensively exposed (fig Q-5) It overlies the Malden Till Member and is overlain by the Wadsworth and Haeger Till Members, the Richland Loess, or in extensive areas by the lake deposits of the Equality Formation (fig Q-2)

Haeger Till Member—The Haeger Till Member of the Wedron Formation (Willman and Frye, 1970, p 69) is named for Haegers Bend, a village on the Fox River in McHenry County, and the type section is in roadcuts half a mile northwest of the village (NW NE 23, 43N-8E) In the type exposure the Haeger Member consists of 12 feet of calcareous, gravelly, silty, yellow-gray till overlying the Yorkville Till Member and overlain by the Richland Loess In some isolated hills the member may be as much as 50-100 feet thick, but it is generally thinner It is overlain by the Wadsworth Till Member east of the area where the Yorkville is the surface drift It occurs only in the northeastern part of the state (fig Q-5)

Wadsworth Till Member—The Wadsworth Till Member of the Wedron Formation (Willman and Frye, 1970, p 70) is named for Wadsworth, Lake County, and the type section is in roadcuts at the intersection of Illinois Highway 131 and Wadsworth Road (SE SE SW 30, 46N-12E) The member consists of the clayey gray tills of the Lake Border Morainic System, the Tinley Moraine, and much of the Valparaiso Morainic System The member occurs above the Haeger and Yorkville Till Members, and it is overlain by very thin Richland Loess It is the youngest till member of the Wedron Formation exposed in Illinois, and it is marginal to the Lake Michigan shore (fig Q-5) It is also present under most of southern Lake Michigan, where it forms the floor of the lake east of Chicago It is overlain by the Equality and Lake Michigan Formations in the center of the southern part of the lake

Oakland Till Member—The Oakland Till Member of the Wedron Formation (Ford, *in* Johnson et al , 1972, p 15) is named for Oakland, Coles County, where it is the surface drift, but it has been described only from its occurrence in the Harmattan strip mine in Vermilion County (NE NE NW 4, 19N-12W) In the Harmattan strip mine it ranges from 0 to more than 30 feet thick It is a coarse, blocky, calcareous, brown till containing wood fragments and mollusk shells (dated at 20,800 ± 130 radiocarbon years B P , sample ISGS-81) It locally contains thin beds of silt, sand, and gravel at the base It occurs above Robein Silt and is overlain by the Glenburn Till Member

Glenburn Till Member—The Glenburn Till Member of the Wedron Formation (Johnson et al , 1971, p 202) is named for Glenburn, Vermilion County, and the type section is in the Emerald Pond Section (NE SW SW 33, 20N-12W) (Johnson et al., 1972, p 42) In the type section it is 17 feet thick and consists of pinkish brown to dark brown, calcareous, somewhat sandy till At the type section it occurs above the Banner Formation of Kansan age and it is overlain by the Batestown Till Member of the Wedron Formation, but elsewhere in Vermilion and adjacent counties it has been described as overlying the Robein Silt and the Oakland Till Member of the Wedron Formation It occurs in central eastern Illinois

Batestown Till Member—The Batestown Till Member of the Wedron Formation (Johnson et al., 1971, p 202) is named for Batestown, Vermilion County, and the type section is in the Emerald Pond Section (NE SW SW 33, 20N-12W) (Johnson et al., 1972, p 42) In the type section the Batestown is 14 feet thick and consists of light olive brown to dark gray, calcareous, sandy to silty till that contains beds of sand and silt and one bed of boulders The Batestown is bounded by the Glenburn Till Member below and the Snider Till Member above, or, where the Snider is absent, by the Richland Loess The member occurs in central eastern Illinois (fig Q-5)

Snider Till Member—The Snider Till Member of the Wedron Formation (Johnson et al , 1971, p 204) is named for Snider, Vermilion County, and the type section is in the Emerald Pond Section (NE SW SW 33, 20N-12W) (Johnson et al , 1972, p 42) In the type section the member is 16 feet thick and consists of light olive-brown to gray-brown, calcareous, blocky, jointed, clayey till and a basal zone of silt, sand, and gravel It occurs in central eastern Illinois (fig Q-5), where it overlies the Batestown Till Member and is commonly overlain by thin Richland Loess The uppermost part of the Snider Till is leached and within the B-horizon of the Modern Soil

Richland Loess

The Richland Loess (Frye and Willman, 1960, p 7) is named for Richland Creek, Woodford County, and the type section is in a roadcut north of the creek (NW SE SW 11, 28N-3W) The formation is massive tan silt that is calcareous below the leached zone of the Modern Soil and is locally fossiliferous (Leonard and Frye, 1960) It is as much as 20 feet thick on the east bluff of the Illinois Valley north of Peoria, but it thins to 1-2 feet in the Chicago area This loess was formerly called Tazewell loess (Leighton, 1933) It rests on deposits of the Wedron, Henry, and Equality Formations inside the area of Woodfordian glaciation (fig Q-1A), and it is terminated upward by the Modern Soil It is not differentiated outside that area, but it is continuous with the upper part of the Peoria Loess (fig Q-8)

Jules Soil

The Jules Soil (Willman and Frye, 1970, p 88) is named for Jules, Cass County, and the type section is in the Jules Section (SE SE NE 13, 18N-11W) (Frye et al , 1968a, p 21) This soil is generally an immature, or A-C, profile with a dark gray solum that lacks a textural B-horizon It occurs within the Peoria Loess and at a few places within the Richland Loess, but only in the thick loess sequences near the Illinois River Valley of central Illinois It represents an interruption in loess deposition between the deposition of the Tiskilwa and Malden Till Members of the Wedron Formation (Frye et al , 1974b)

Twocreekan Substage

The Twocreekan Substage (Frye and Willman, 1960, p 8) is named for Two Creeks, Manitowoc County, Wisconsin, and the type section is in the Two Creeks Section, 2 miles east of the town in the bluff of Lake Michi-

gan (Thwaites and Bertrand, 1957, p. 859-864; Frye et al., 1965, p. 57). At the type locality, lake deposits of silt and sand and the forest bed overlie till and, in turn, are overlain by till. Many radiocarbon dates have been obtained from wood of the forest bed in the upper part of the Two Creeks deposits (Black and Rubin, 1968), and the time span for the substage is from 12,500 to 11,000 radiocarbon years B.P. Deposits of the Twocreekan Substage have not been specifically differentiated in Illinois, although they occur in the Equality Formation sediments of Lake Chicago and other glacial lakes and in the various surficial formations that are dominantly of Holocene age

Valderan Substage

The Valderan Substage (Thwaites, 1943; Frye and Willman, 1960, p 9) is named for Valders, Manitowoc County, Wisconsin, and the type section was designated as the drift in a quarry at Valders (Thwaites and Bertrand, 1957, p 864-866). The base of the substage is defined (Frye et al , 1968b, p E18) as the contact of the Valders till on the Two Creeks forest bed at the Two Creeks Section, eastern Wisconsin, and the top is defined as the top of the Cochrane till below post-Cochrane deposits in the James Bay Lowland of Ontario, Canada (Hughes, 1956)—a time span from 11,000 to 7,000 radiocarbon years B.P. Recent studies (Evenson, 1973) suggested that the till in the quarry at Valders is equivalent to the till beneath the Two Creeks forest bed and is therefore Woodfordian in age. If that finding is confirmed, the Two Creeks exposure, the type section of the Twocreekan Substage, should preferably be designated as the reference section for the Valderan Substage as well. The name "Valderan Substage," now well established for the drift younger than Twocreekan, as clearly intended by Thwaites (1943), Leighton (1957), and others, can then be retained. The rock-stratigraphic name for the post-Twocreekan till in eastern Wisconsin may conveniently be changed from Valders till to Two Rivers Till, as proposed by Evenson (1973) and Lineback et al. (1974). In Illinois, deposits of the Valderan Substage occur in the Equality Formation, particularly in the deposits of Lake Algonquin in the Lake Michigan Basin, in the Henry Formation along the Mississippi Valley, and in the various surficial formations that are dominantly of Holocene age.

Holocene Stage

The Holocene Stage, although based on a term and a concept that developed more than a century ago, has never been properly defined as a time-stratigraphic unit It has been accepted as a replacement for "Recent" by the U. S. Geological Survey (Cohee, 1968) but without formal stratigraphic definition For formal use in Illinois, Holocene Stage has replaced Recent Stage as the youngest time-stratigraphic subdivision of the Pleistocene Series (Willman and Frye, 1970, p 126) In that sense it is defined as embracing all deposits younger than the top of the Wisconsinan Stage. The Holocene Age, therefore, extends from approximately 7000 radiocarbon years B.P. to the present. Six formations in Illinois are dominantly of Holocene age, but in many localities these surficial deposits began to accumulate and the Modern Soil began to develop as soon as the glaciers melted from the area, consequently, the lower parts of the deposits are Wisconsinan in age (fig. Q-4). These deposits are generally overlain only by the Modern Soil developed in their tops, but along marginal areas there is some overlapping and interfonguing. To avoid repetition of a formation in a single section or the occurrence of formations in different orders, each surficial formation can be overlain only by the surficial formations that are specified in the description given for that formation The order is based on the most common relations In complex relations the formations are terminated laterally by a vertical cut-off Holocene deposits are abundant throughout Illinois.

Cahokia Alluvium

The Cahokia Alluvium (Willman and Frye, 1970, p 75) is named for Cahokia, St Clair County, which is located on the floodplain of the Mississippi River, and the type section is in a boring drilled 3 miles southwest of Cahokia (4300 feet south of lat 38°32'30" N and 5200 feet east of long 90°15' W) (Bergstrom and Walker, 1956, test hole No 2) In the boring, the Cahokia consists of 45 feet of silt, clay, and silty sand, overlying 60 feet of sand and gravel of the Henry Formation, which rests on bedrock The Cahokia Alluvium includes the deposits in the floodplains and channels of present rivers and streams, and the name replaces the long-used informal term "Recent Alluvium." Although largely of Holocene age, the formation in many places probably contains some deposits as old as Woodfordian It consists mainly of poorly sorted silt, clay, and silty sand but locally contains lenses of sand and gravel Its thickness varies greatly but rarely exceeds 50 feet The formation rests on rocks of many ages It generally is terminated upward by the surface of the floodplain and the Modern Soil, but locally it is overlain by the Parkland Sand, the Grayslake

Peat, the Lacon Formation, or the Peyton Colluvium. The Cahokia Alluvium occurs throughout Illinois in valley bottoms (fig. 11).

Parkland Sand

The Parkland Sand (Willman and Frye, 1970, p 78) is named for Parkland, Tazewell County, and the type section is in a roadcut 5 miles west of Parkland (SW SE SW 2, 23N-7W) The formation consists of windblown sand in dunes and sheet-like deposits. The thickness ranges sharply—some dunes reach 100 feet high—but the range is commonly 20-40 feet The Parkland Sand is a surficial deposit, but it is locally overlain by the Richland Loess, the Peyton Colluvium, or the Lacon Formation It occurs in large areas along the Illinois River Valley of central Illinois, the Green River Lowland and the Mississippi Valley of northwestern Illinois, the Kankakee Valley in northeastern Illinois, and in smaller areas elsewhere

Grayslake Peat

The Grayslake Peat (Willman and Frye, 1970, p 77) is named for Grayslake, Lake County, and the type section is in a pit 1 mile southeast of Grayslake (NE SE NE 2, 44N-10E), where 14 feet of peat is exposed (Hester and Lamar, 1969) The formation consists of peat, sandy and silty peat, muck rich in organic material, and a foot or two of silt at the top In some places it contains beds of marl, silt, and clay It rarely exceeds 20 feet thick Although it is a surficial formation, it is locally overlain by the Cahokia Alluvium, the Parkland Sand, the Peyton Colluvium, or the Lacon Formation It occurs as a filling of ponds and poorly drained areas, principally in the region of Wisconsinan glaciation, and in the bottomlands of the major valleys

Lacon Formation

The Lacon Formation (Willman and Frye, 1970, p 77) is named for Lacon, Marshall County, and the type locality is a landslip area along the bluffs of the Illinois River Valley, 2 miles northwest of Lacon (E½ 2, 12N-9E) (Ekblaw, 1932) The formation consists of gravity-initiated deposits, such as landslides, slumps, slips, and rock falls, most of which are triggered by seasonal increases in pore-water pressure and move over surfaces lubricated by infiltrated water The material is unsorted and reflects a local source It is a surficial formation, and where it locally interfingers with the Cahokia Alluvium and the Peyton Colluvium it is considered part of those formations It occurs in the many parts of the state where valley bluffs are prominent

Peyton Colluvium

The Peyton Colluvium (Willman and Frye, 1970, p 79) is named for Peyton Creek, Peoria County, and the type section is along the creek at the base of the Illinois Valley bluffs, 1.5 miles southwest of Glasford (NW NE 32, 7N-6E) The locality is mapped as slopewash and alluvial fans (Wanless, 1957) The formation includes the widely distributed but narrow belts of poorly sorted debris that have accumulated on the lower slopes and at the base of slopes by processes of creep, slopewash, and mudflow The many small cones and fans that occur at the mouths of gullies and rest on floodplain or terrace surfaces, generally interfingering with colluvium, are included in the formation The Peyton is a surficial formation and is not overlain by other formations Where it intertongues with the Cahokia Alluvium it is included in that formation

Lake Michigan Formation

The Lake Michigan Formation (Willman and Frye, 1970, p 78), named for Lake Michigan, consists of the surficial lacustrine and beach deposits of the southern part of the lake A cross section of the lake sediments along a line 12-32 miles east of Waukegan, Lake County, is the type locality (Gross et al , 1970) The formation also includes the deposits in the basins of other natural lakes in Illinois It overlies Paleozoic rocks, glacial deposits of Wisconsinan age, or the Equality Formation, and it is overlain only by water or, on the beaches, by air The sediments of the Lake Michigan Formation in the southern part of the lake have been described (Gross et al., 1970, Lineback et al , 1970, 1972, Lineback and Gross, 1972), and the chemical composition and trace element content of the sediments have been analyzed (Shimp et al., 1970, 1971, Ruch et al , 1970, Schleicher and Kuhn, 1970, Kennedy et al , 1971, Frye and Shimp, 1973) The formation attains a maximum thickness of more than 60 feet, but generally it is less than 40 feet thick It is composed of clay, silt, a small proportion of sand; and local accumulations of organic matter Seven members have been differentiated in the formation (fig Q-4), all but one (Ravinia) of which have been defined from cores taken from the southern part of Lake Michigan

South Haven Member—The South Haven Member of the Lake Michigan Formation (Lineback et al , 1970, p 11) is named for South Haven, Ottawa County, Michigan, and the type section is the interval from 219 3 cm to the base of core 143 (lat 42°21 8′ N, long 78°10 8′ W, at a water depth of 390 feet) It is the lowest member of the formation and consists of reddish gray clay, generally less than 3 5 feet thick, on the east side of the lake The member rests on the Wedron Formation, Equality Formation, or bedrock

Sheboygan Member—The Sheboygan Member of the Lake Michigan Formation (Lineback et al , 1970, p 11) is named for Sheboygan, Sheboygan County, Wisconsin, and the type section is the interval 112-219 3 cm in core 143, the same core as the type of the South Haven Member The member consists of two reddish brown to brown clay units separated by a thin, persistent layer of gray clay The member ranges up to 4 feet thick, is overlain by the Winnetka Member, and rests on the South Haven Member or the Equality Formation Its maximum development is in the mid-lake area and it occurs only where water depth exceeds 230 feet It thins shoreward to the east, south, and west It is absent from the southwestern part of the lake

Wilmette Bed—The Wilmette Bed of the Sheboygan Member of the Lake Michigan Formation (Lineback et al , 1970, p 11) is named for Wilmette, Cook County, and the type section is in the type section of the Sheboygan Member It is a bed of gray clay, with some silt and sand, in the middle of the Sheboygan Member It is 3-9 inches thick, and it occurs only in the area of southern Lake Michigan where water depth exceeds 270 feet.

Winnetka Member—The Winnetka Member of the Lake Michigan Formation (Lineback et al , 1970, p 8) is named for Winnetka, Cook County, and the type section is the interval 35 5-112 cm in core 143, the same core as the type of the South Haven Member The member consists of brownish gray clay with a few interspersed black beds It becomes somewhat sandy near the shore, but generally it is finer grained

than the overlying members It is 1-6 feet thick It rests on the South Haven and Sheboygan Members and the Equality Formation, and it is overlain by the Lake Forest and Waukegan Members The Winnetka is absent where the Wedron or Equality Formations are near the sediment surface

Lake Forest Member—The Lake Forest Member of the Lake Michigan Formation (Lineback et al , 1970, p 8) is named for Lake Forest, Lake County, and the type section is the interval 16-35.5 cm in core 143, the same core as the type of the South Haven Member The member is dark gray silty clay that usually contains many thin beds of black clay The black beds contain more organic matter than the enclosing deposits and have been radiocarbon dated at 6920 ± 200 radiocarbon years B P (sample ISGS-33) and 7050 ± 200 radiocarbon years B P (sample ISGS-36) The member is generally siltier than the Winnetka and Sheboygan Members below and less sandy and more compact than the Waukegan Member above It is 0-4 feet thick It is present on the western and southern sides of southern Lake Michigan but is absent from the central and eastern areas

Waukegan Member—The Waukegan Member of the Lake Michigan Formation (Lineback et al , 1970, p 6) is named for Waukegan, Lake County, and the type section is the interval 0-16 cm in core 143, the same core as the type of the South Haven Member It is the surficial sediment of the formation in large areas in the center and along the eastern side of southern Lake Michigan It is distributed widely over the offshore lake floor except at a few places where bedrock or till form the lake bottom It consists of soft sandy silt, silty clay with a high water content, sand, and gravel It is 0 1-30 feet thick The member becomes sandier near shore and in the southwestern part of the lake A gray silt facies occurs on the east side of the lake where the member is thickest, and a brown silt facies is on the west side where the member thins to less than a foot thick (Lineback and Gross, 1972)

Ravinia Sand Member—The Ravinia Sand Member of the Lake Michigan Formation (Willman and Frye, 1970, p 78) is named for Ravinia, in the southern part of Highland Park, Lake County, where the type exposure is an accessible section of the Lake Michigan beach (W1/2 31, 43N-13E) It consists of well sorted, largely medium-grained, nearly white beach sand containing local lenses of gravel It is relatively clean, except for man-made litter and driftwood Smaller areas of beach sand present along the shores of other natural lakes in Illinois are included in the Ravinia The Ravinia Member includes only beach sand and is separated from the rest of the formation at the base of the low-water swash zone Sands occurring offshore are included in the Waukegan Member The character of the beach sands and adjacent deposits in extreme northeastern Illinois and the history of their development have been described by Hester and Fraser (1973)

Modern Soil

As a soil-stratigraphic unit, the term "Modern Soil" (Willman and Frye, 1970, p 89) is applied to any soil profile genetically related to the present topographic surface It underlies the surface of most of Illinois The soil ranges from very shallow to several feet in depth and is developed in any sediment that immediately underlies the existing land surface The type section is the uppermost five units in the Buda East Section in Bureau County (SE SE SW 31, 16N-8E) (Frye et al , 1968a, p 20) The term carries no implication of soil type in the soil science classification

Morphostratigraphy

The morphostratigraphic units called drifts, which are based on glacial moraines, are described for each of the glacial lobes (fig. Q-9). A few moraines are continuous from one lobe into another, and a unit is described in the lobe where it is first mentioned. The extent of the named moraines of the Wisconsinan Stage is shown in figure Q-10. The Illinoian moraines and ridged drift areas are shown in figure Q-2. The fact that the drift is based on the moraine is not repeated in the description of each drift. The original namer of the moraine is cited as the namer of the drift. Alluvial terraces are classified as informal morphostratigraphic units. Those named were listed by Willman and Frye (1970).

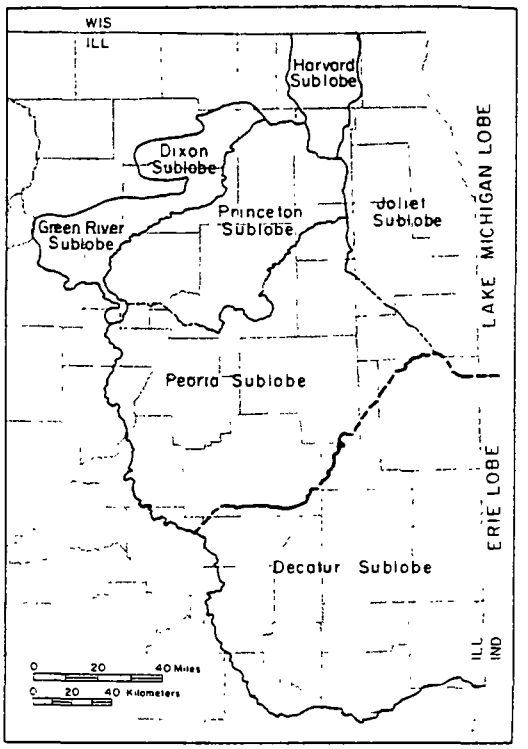


Fig. Q-9—Woodfordian lobes and sublobes in Illinois (Willman and Frye, 1970).

ERIE LOBE

Drift deposited by glaciers that invaded Illinois from the east is assigned to the Erie Lobe (fig. Q-9), although the lobe probably includes contributions by ice from the Lake Huron and Saginaw Lobes, which merged with the Erie Lobe. Erie Lobe glaciers ad-

vanced into Illinois during the Kansan, Illinoian, and Wisconsinan Stages, and their drifts are characterized in general by larger amounts of garnet than epidote, by dominance of illite, by the presence of both kaolinite and chlorite, and by more calcite than dolomite In the Erie Lobe, morphostratigraphic units are differentiated only in the Wisconsinan Stage and are part of the Decatur Sublobe.

Decatur Sublobe Drifts

The Decatur Sublobe drifts are related to two morainic systems and 22 named moraines (figs Q-9, Q-10) The drift is divided into the Oakland, Glenburn, Batestown, and Snider Till Members of the Wedron Formation

Shelbyville Drifts (Leverett, 1897, p 17)—The Shelbyville Morainic System is named for Shelbyville, Shelby County The drift is the outer and oldest Woodfordian drift in both the Decatur and Peoria Sublobes The massive morainic system represents successive deposits of a fluctuating ice front that in the eastern part of the Decatur Sublobe produced three closely related moraines—Westfield, Nevins, and Paris The morainic system extends west from the Indiana state line and then northwest about 200 miles to Peoria In the Decatur Sublobe the drift consists of pinkish gray till of the Glenburn Till Member In the Peoria Sublobe it is gray till that, with the Le Roy Drift, forms the Delavan Till Member of the Wedron Formation, and it is generally readily distinguishable from the overlying pink till of the Tiskilwa Till Member

Westfield Drift (Willman and Frye, 1970, p 92)—The Westfield Moraine, named for Westfield, Clark County, is the outermost moraine of the Shelbyville Morainic System and is traced for about 40 miles

Nevins Drift (Willman and Frye, 1970, p 92)—The Nevins Moraine, named for Nevins, Edgar County, the middle moraine of the Shelbyville Morainic System, is separated from the other moraines by narrow depressions and is traced for about 40 miles

Paris Drift (Willman and Frye, 1970, p 92)—The Paris Moraine, named for Paris, Edgar County, is the inner moraine of the Shelbyville Morainic System It is traced from near the Indiana state line westward for about 50 miles

Heyworth Drift (Willman and Frye, 1970, p 92)—The Heyworth Moraine is named for Heyworth, McLean County It is a weakly morainic area east and north from Clinton In shape and orientation it differs from other Woodfordian moraines, and it may be an Illinoian moraine mantled with Woodfordian drift

Turpin Drift (Willman and Frye, 1970, p 92)—The Turpin Moraine is named for Turpin, Macon County The moraine is a sharp ridge that extends only about 6 miles from Turpin northeast to the front of the Cerro Gordo Moraine Because its orientation is parallel to Illinoian ridges and normal to the Woodfordian moraines, it, like the Heyworth, may be a mantled Illinoian ridge

Cerro Gordo Drift (Leverett, 1899, p 218)—The Cerro Gordo Moraine, named for Cerro Gordo, Piatt County, is a strongly lobate ridge extending for about 80 miles It probably represents a major readvance of the ice front

Arcola Drift (Leighton and Brophy, 1961, fig 1)—The Arcola Moraine, named for Arcola, Douglas County, extends for about 50 miles and forms two well defined lobes The western lobe once enclosed a large lake called Lake Douglas

Pesotum Drift (Leighton and Brophy, 1961, fig 1)—The Pesotum Moraine, named for Pesotum, Champaign County, is a relatively weak ridge, in part flat-topped, that is traced for about 25 miles

West Ridge Drift (Leverett, 1899, p 223)—The West Ridge Moraine, named for West Ridge, a small village 3 miles southwest of Villa Grove, Douglas County, extends for about 50 miles

Hildreth Drift (Willman and Frye, 1970, p 94)—The Hildreth Moraine, named for Hildreth, Edgar County, extends from the Indiana state line westward for about 25 miles

Ridge Farm Drift (Willman and Frye, 1970, p 94)—The Ridge Farm Moraine, named for the town of Ridge Farm, Vermilion County, extends westward from the Indiana state line for about 25 miles

Champaign Drift (Leverett, 1897, p 18)—The Champaign Moraine, named for Champaign, Champaign County, was originally called the Champaign Morainic System and included the Pesotum, Hildreth, Ridge Farm, and Urbana Moraines As those drifts have overlapping relations, they are now considered separate moraines (Willman and Frye, 1970) The Champaign Moraine is restricted to the ridge extending from Champaign to the Bloomington Morainic System, about 30 miles

Rantoul Drift (Willman and Frye, 1970, p 94)—The Rantoul Moraine, named for Rantoul, Champaign County, is a broad morainic ridge extending 15 miles southwest from the Newtown Moraine to the Champaign Moraine Because of its alignment on the trends of earlier Woodfordian moraines, it may be a buried moraine mantled with Champaign Drift

Urbana Drift (Ekblaw, 1941)—The Urbana Moraine, named for Urbana, Champaign County, extends from Rantoul through Urbana to the Indiana state line, about 50 miles

Illiana Drifts (Willman and Frye, 1970, p 95)—The Illiana Morainic System, formerly considered part of the Bloomington Morainic System, is named for Illiana, Vermilion County, on the Illinois-Indiana state line The system consists of two closely parallel moraines differentiated as the Newtown and Gifford Moraines, and it extends eastward from the Gibson City interlobate area about 50 miles to the state line

Newtown Drift (Willman and Frye, 1970, p 95)—The Newtown Moraine, named for Newtown, Vermilion County, is the frontal moraine of the Illiana Morainic System

Gifford Drift (Leighton and Brophy, 1961, p 95)—The Gifford Moraine, named for Gifford, Champaign County, is the inner and higher moraine of the Illiana Morainic System

Paxton Drift (Willman and Frye, 1970, p 95)—The Paxton Moraine, named for Paxton, Ford County, extends eastward across the Decatur Sublobe from the Gibson City reentrant to the Indiana state line, about 55 miles It previously was considered the frontal moraine of the discontinued Chatsworth Morainic System

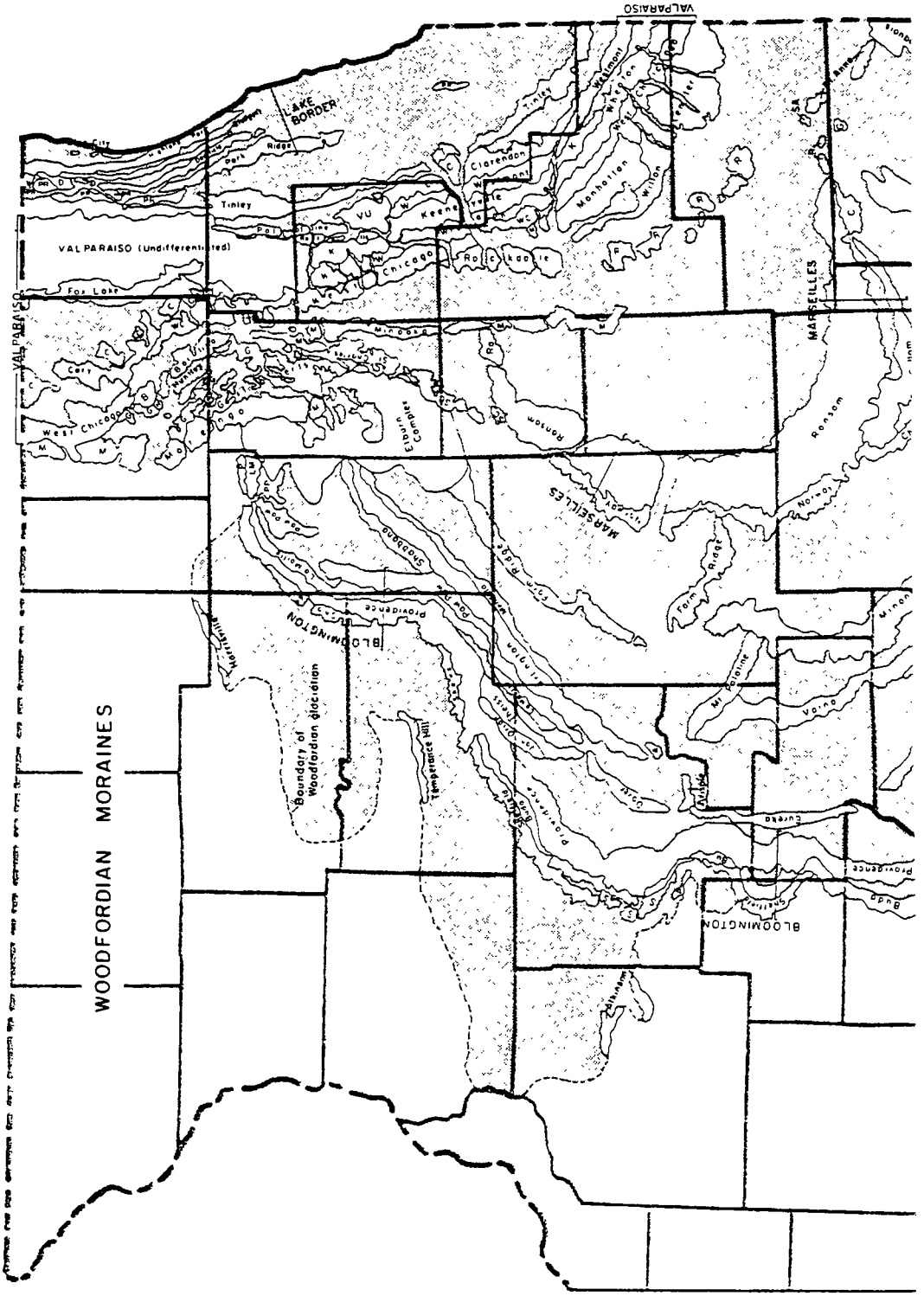
Ellis Drift (Willman and Frye, 1970, p 96)—The Ellis Moraine, named for Ellis, Vermilion County, was formerly classified as part of the Chatsworth Morainic System It is a relatively weak moraine but is traced for about 45 miles

Chatsworth Drift (Leverett, 1899, p 259)—The Chatsworth Moraine, named for Chatsworth, Livingston County, is a prominent moraine 75 miles long with strong relief It occurs in both the Decatur and Peoria Sublobes

Gilman Drift (Willman and Frye, 1970, p 96)—The Gilman Moraine, named for Gilman, Iroquois County, is a broad but weak lobate ridge about 40 miles long, partially covered by the deposits of glacial Lake Watseka

St. Anne Drift (Willman and Frye, 1970, p 96)—The St Anne Moraine, named for St Anne, Kankakee County, is a weak morainic ridge extending only about 15 miles from Mt Langham, a large kame, to the Iroquois Moraine.

Iroquois Drift (Leverett, 1899, p 258, 336)—The Iroquois Moraine, named for Iroquois County, is the youngest deposit of the Erie Lobe, though possibly a contribution of


WOODFORDIAN MORAINES
VALPARAISO
LAKE BORDER
VALPARAISO (Undifferentiated)
Fox Lake
Trinity
Clarendon
Chicago Rd
MARSEILLES
Ransom
BLOOMINGTON
Boundary of Woodfordian glaciation
Temperance Hill
Mt Palatine
Wauconda
Algonquin

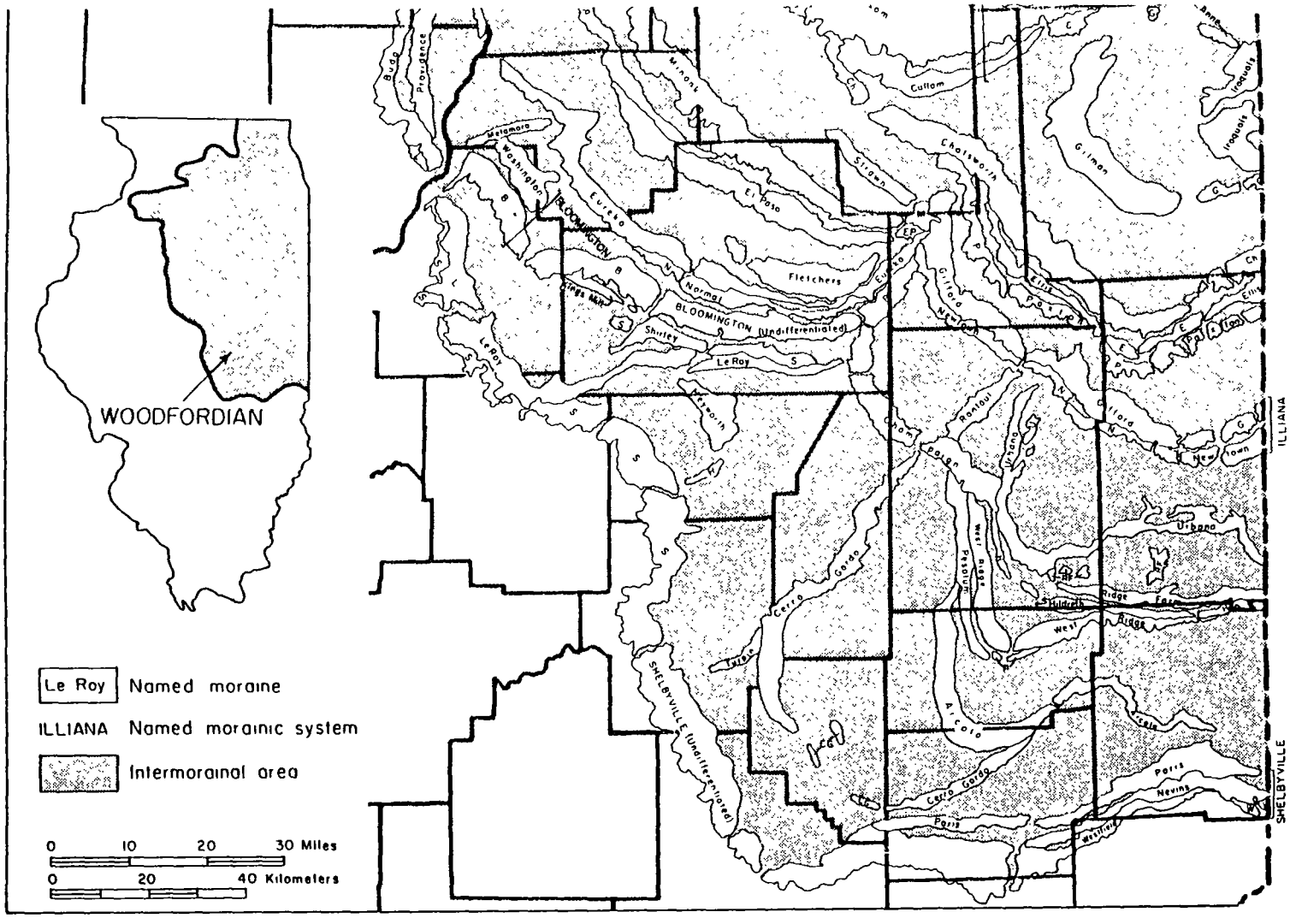


Fig. Q-10—Woodfordian glacial moraines in Illinois (Willman and Frye, 1970).

the Saginaw Lobe, in Illinois It is the deposit of a glacier that invaded Illinois from the east for about 8 miles along a 15-mile front

LAKE MICHIGAN LOBE

Drift deposited by glaciers that followed the Lake Michigan Basin and spread westward and southwestward across Illinois is referred to the Lake Michigan Lobe (fig Q-9). Morphostratigraphic units are differentiated in the Lake Michigan Lobe drifts of Illinoian and Wisconsinan age. Moraines are widely spaced and discontinuous in the Illinoian drift (fig. Q-2), but are locally useful in morphostratigraphic classification In the Wisconsinan Woodfordian drift, the moraines are more useful in classification because of their continuity (fig. Q-10) and because many represent readvances of the ice front that produced layered sequences in the drift After the Woodfordian ice overflowed the Lake Michigan Basin, it was diverted by topographic irregularities and contact with the Erie Lobe glaciers into several sublobes that controlled the distribution of the moraines deposited during the fluctuating withdrawal of the ice front. The major groups of nearly parallel moraines are differentiated as the Peoria, Green River, Dixon, Princeton, Harvard, and Joliet Sublobes The drift consists of tills and interlayered water-laid deposits that, in the rock-stratigraphic classification, are assigned to the Wedron Formation and divided into eight members on the basis of differences in till composition (fig Q-5).

Illinoian Drifts

Mendon Drift (Leighton and Brophy, 1961, pl 1, p 15, Frye et al , 1964, p 14)—The Mendon Moraine, named for Mendon, Adams County, marks the outer limit of the Illinoian drift of the Lake Michigan Lobe It extends from the Mississippi River Valley near Warsaw to the Illinois River Valley at Pearl, about 90 miles South of Pearl it is absent along the Illinois Valley for many miles, but it is probably represented by moraine topography in Jersey County north of the confluence of the Illinois and Mississippi Rivers However, that area may also include an extension of the Table Grove Moraine The Mendon Drift is largely the Kellerville Till Member of the Glasford Formation

Table Grove Drift (Willman and Frye, 1970, p 114)—The Table Grove Moraine, named for Table Grove, Fulton County, is a distinctly moraine ridge extending through the middle part of the area of Illinoian drift in western Illinois Although continuous for about 75 miles, its continuation east of the Illinois Valley and north of southern Knox County is uncertain It marks the front of the Hulick Till Member of the Glasford Formation

Oneida Drift (Willman and Frye, 1970, p 115)—The Oneida Moraine, named for Oneida, Knox County, is a weak moraine ridge traced for about 15 miles in Knox and Henry Counties

Williamsfield Drift (Willman and Frye, 1970, p 115)—The Williamsfield Moraine, named for Williamsfield, Knox County, is a weak moraine ridge that extends southward from Williamsfield for about 7 miles

Oak Hill Drift (Willman and Frye, 1970, p 115)—The Oak Hill Moraine, named for Oak Hill, Peoria County, is a continuous ridge extending northwest from the front of the Wisconsinan drift for about 20 miles It may mark the front of a significant readvance because it is the outer limit of the Radnor Till Member of the Glasford Formation

Jacksonville Drift (Ekblaw, *in* Ball, 1938, p 219)—The Jacksonville Moraine, named for Jacksonville, Morgan County, is a discontinuous belt of moraine hills and crevasse deposits, without a well defined front, in Morgan and Montgomery Counties

Buffalo Hart Drift (Leverett, 1899, p 74-76)—The Buffalo Hart Moraine, named for Buffalo Hart, Sangamon County, is a broad area of moraine topography, crevasse deposits, and kames It has the mineral composition of the Radnor Till and probably correlates with the Oak Hill Moraine west of the Illinois Valley

Wisconsinan (Woodfordian) Drifts

Peoria Sublobe Drifts

The Peoria Sublobe drifts include three moraine systems and 20 individual moraines (figs Q-9, Q-10) The outermost moraine is part of the Shelbyville Moraine System, already described as being largely in the Erie Lobe, which extends northward in the Peoria Sublobe to Peoria.

Le Roy Drift (Ekblaw, 1941)—The Le Roy Moraine, named for Le Roy, McLean County, is a lobate ridge that is traced for about 70 miles and may represent a significant readvance of the ice that was probably equivalent to the strongly lobate readvance of the Decatur Sublobe glacier that deposited the Cerro Gordo Moraine

Shirley Drift (Willman and Frye, 1970, p 98)—The Shirley Moraine, named for Shirley, McLean County, is a minor moraine about 25 miles long

Kings Mill Drift (Willman and Frye, 1970, p 98)—The Kings Mill Moraine, named for Kings Mill Creek in McLean County, is a weak moraine ridge extending for only 10 miles near the front of the Bloomington Moraine System

Bloomington Drifts (Leverett, 1897, p 19)—The Bloomington Moraine System, named for Bloomington, McLean County, is one of the most prominent moraine features of the Lake Michigan Lobe drift and it forms the front of the Peoria, Princeton, and Harvard Sublobes The major part of the drift is the pink till of the Tiskilwa Member of the Wedron Formation, which distinguishes it from the older gray tills and the younger yellow-tan tills of Woodfordian age North of Peoria the system consists of three well defined moraines, but in other places only one or two crests are recognizable Five ridges are named in the Peoria Sublobe—the Washington, Metamora, Sheffield, Buda, and Providence Moraines

Washington Drift (Willman and Frye, 1970, p 99)—The Washington Moraine, named for Washington, Tazewell County, is a minor moraine area back of the main ridge of the Bloomington Moraine System and can be traced for about 10 miles in the southern part of the Peoria Sublobe

Metamora Drift (Ekblaw, 1941)—The Metamora Moraine, named for Metamora, Woodford County, is a well defined ridge about 10 miles long that probably marks the eastern margin of a narrow lobe that extended into the Illinois River Valley during the final stages of the building of the Bloomington Moraine System

Sheffield Drift (MacClintock and Willman, 1959, p 23)—The Sheffield Moraine, named for Sheffield, Bureau County, is the outermost moraine of the Bloomington Morainic System in the Peoria Sublobe and in the southern part of the Princeton Sublobe It is about 60 miles long

Buda Drift (MacClintock and Willman, 1959, p 23)—The Buda Moraine, named for Buda, Bureau County, is a prominent morainic ridge about 65 miles long that extends from Peoria northward into the Princeton Sublobe It generally is the middle ridge of the Bloomington Morainic System

Providence Drift (MacClintock and Willman, 1959, p 24)—The Providence Moraine, named for Providence, Bureau County, forms the crest of the Bloomington Morainic System and rises as much as 200 feet above the frontal outwash plain In many areas it has a very rough knob and kettle topography It is traced from Peoria northeastward for about 125 miles in the Peoria and Princeton Sublobes It is probably equivalent to the Metamora Moraine east of the Illinois Valley

Normal Drift (Leighton and Ekblaw, 1932, p 13)—The Normal Moraine, named for Normal, McLean County, is the first moraine back of the Bloomington Morainic System It is traced for about 35 miles in the southern part of the Peoria Sublobe, in which area it is the front of the gray to tan silty till differentiated as the Malden Till Member of the Wedron Formation

Eureka Drift (Willman and Frye, 1970, p 100)—The Eureka Moraine, named for Eureka, Woodford County, extends for about 100 miles, entirely across the Peoria Sublobe It formerly was correlated with the Normal Moraine, but it overlaps the Normal and forms the front of the Malden Till Member

Fletchers Drift (Willman and Frye, 1970, p 100)—The Fletchers Moraine, named for Fletchers, a railroad siding 3 miles southwest of Cooksville, McLean County, also was formerly included in the Normal Moraine It has a well defined front and is traced westward from the Gibson City reentrant for about 20 miles

El Paso Drift (Leighton and Brophy, 1961, fig 1)—The El Paso Moraine, named for El Paso, Woodford County, previously considered the frontal ridge of the discontinued Cropsey Morainic System, is traced westward from the Gibson City reentrant for about 45 miles

Varna Drift (Willman and Frye, 1970, p 100)—The Varna Moraine, named for Varna, Marshall County, was previously part of the discontinued Cropsey Morainic System The Varna is traced for 40 miles but is eroded at the Illinois River Valley

Minonk Drift (Willman and Frye, 1970, p 101)—The Minonk Moraine, named for Minonk, Woodford County, was previously part of the discontinued Cropsey Morainic System It extends for 65 miles, entirely across the Peoria Sublobe.

Strawn Drift (Willman and Frye, 1970, p 101)—The Strawn Moraine, named for Strawn, Livingston County, is a weak morainic ridge between the Minonk and Chatsworth Moraines and was previously included in the discontinued Cropsey Morainic System. It is traced for only about 15 miles

Marseilles Drifts (Leverett, 1897, p 20)—The Marseilles Morainic System, named for Marseilles, La Salle County, is a massive ridge that generally exhibits a distinct lower frontal ridge The frontal ridge is not continuous, the north part is named Norway and the south part Cullom The higher, continuous crest is differentiated as the Ransom Moraine The Ransom is largely greenish gray clayey till, which is part of the Yorkville Till Member of the Wedron Formation It forms the innermost drift of the Peoria Sublobe and extends entirely across the sublobe.

Norway Drift (Willman and Frye, 1970, p 102)—The Norway Moraine, named for Norway, La Salle County, extends for about 40 miles along the front of the northern part of the Marseilles Morainic System

Cullom Drift (Leighton and Brophy, 1961, fig 1)—The Cullom Moraine, named for Cullom, Livingston County, occupies a position similar to that of the Norway Moraine for about 35 miles along the southern part of the Marseilles Morainic System

Ransom Drift (Willman and Frye, 1970, p 102)—The Ransom Moraine, named for Ransom, La Salle County, forms the main crest of the Marseilles Morainic System and is traced for about 100 miles

Green River and Dixon Sublobes Drifts

Because of their position outside the Bloomington Morainic System, the drifts of the Green River and Dixon Sublobes (figs Q-9, Q-10) are probably equivalent to the Shelbyville Drift in the Decatur and Peoria Sublobes The Woodfordian drift is thin, and only three areas of morainic topography along the margins of the sublobes are named

Temperance Hill Drift (Willman and Frye, 1970, p 103)—The Temperance Hill Moraine, named for Temperance Hill School, 3 miles northwest of Lee Center, Lee County, is a ridge traced for about 12 miles along the northern side of the Green River Sublobe

Atkinson Drift (Willman and Frye, 1970, p 103)—The Atkinson Moraine, named for Atkinson, Henry County, consists of patches of morainic hills along the southern side of the Green River Sublobe

Harrisville Drift (Willman and Frye, 1970, p 102)—The Harrisville Moraine, named for Harrisville, Winnebago County, extends for about 10 miles along the north side of the Dixon Sublobe

Princeton Sublobe Drifts

The Princeton Sublobe (figs Q-9, Q-10) includes one morainic system, 16 named moraines, and one complex—an area with variously oriented morainic ridges The pink sandy till of the Tiskilwa Till Member of the Wedron Formation characterizes the outer part of the drift, followed successively eastward by the gray-tan silty till of the Malden Till Member and the gray clayey till of the Yorkville Till Member

Bloomington Drifts—The southern moraines of the Bloomington Morainic System, the Sheffield, Buda, and Providence Moraines that were previously described for the Peoria Sublobe, extend northward into the Princeton Sublobe, but five other moraines are differentiated locally in the system in the Princeton Sublobe—the Shaws, Van Orin, Theiss, La Moille, and Paw Paw Moraines—all of which consist largely of the pink till of the Tiskilwa Till Member

Shaws Drift (Willman and Frye, 1970, p 105)—The Shaws Moraine, named for Shaws, Lee County, is the outermost ridge of the Bloomington Morainic System, occupying a position in the northern part of the sublobe similar to that of the Sheffield Moraine farther south It has been traced for about 25 miles

Van Orin Drift (Willman and Frye, 1970, p 105)—The Van Orin Moraine, named for Van Orin, Bureau County, is a well defined ridge but is traced for only about 10 miles before it blends into the back slope of the Providence Moraine

Theiss Drift (Willman and Frye, 1970, p 105)—The Theiss Moraine, named for Theiss Cemetery, 3 miles southwest of Sublette, Lee County, is a distinct ridge for about 16 miles, but it, too, blends into the back slope of the Providence Moraine.

La Moille Drift (Willman and Frye, 1970, p 105)—The La Moille Moraine, named for La Moille, Bureau County, is a narrow ridge that is traced for about 50 miles In its southern part it separates from the Bloomington Morainic System

Paw Paw Drift (Willman and Frye, 1970, p 106)—The Paw Paw Moraine, named for Paw Paw, Lee County, is the inner moraine of the northern part of the Bloomington Morainic System and is traced for about 50 miles It is a prominent moraine that, southward, separates from the Bloomington Morainic System, and in part of that area it has a thin overlapping cover of yellow-tan till of the Malden Till Member

Shabbona Drift (Willman and Frye, 1970, p 106)—The Shabbona Moraine, named for Shabbona, De Kalb County, is a weakly morainic area about 18 miles long that consists largely of a thin deposit of the Malden Till Member It marks a major readvance of the ice front

Dover Drift (Cady, 1919b, p 24, 81)—The Dover Moraine, named for Dover, Bureau County, is traced for about 12 miles It marks the front of the Malden Till Member and is probably equivalent to the Shabbona Moraine, but cannot be traced directly to it

Arispie Drift (Willman and Frye, 1970, p 106)—The Arispie Moraine, named for Arispie Township, Bureau County, is an east-west ridge only 4 miles long, eroded at the Illinois River Valley, but it probably is a connecting link between the Varna Moraine in the Peoria Sublobe and the Dover Moraine in the Princeton Sublobe

Arlington Drift (Cady, 1919b, p 24, 81)—The Arlington Moraine, named for Arlington, Bureau County, is a prominent moraine that is traced northeastward from the Illinois River Valley for 55 miles

Mt. Palatine Drift (Leighton and Brophy, 1961, fig 1)—The Mt Palatine Moraine, named for Mt Palatine, Putnam County, is a prominent ridge on the south side of the Princeton Sublobe, where it is traced for about 15 miles It probably correlates with the Arlington Moraine on the north side of the lobe

Mendota Drift (Willman and Frye, 1970, p 107)—The Mendota Moraine, named for Mendota, La Salle County, is a weakly morainic ridge that can be traced on the back slope of the Arlington Moraine for about 40 miles.

Farm Ridge Drift (Leverett, 1899, p 260)—The Farm Ridge Moraine is named for Farm Ridge, which is now called Grand Ridge, La Salle County It has a lobate configuration and extends for 35 miles north of the Illinois River Valley and for 15 miles south of the valley

Elburn Drift (Willman and Frye, 1970, p 107)—The Elburn Complex, named for Elburn, Kane County, is an area of variously oriented morainic ridges, kames, eskers, and lake basins at the junction of the Princeton and Harvard Sublobes.

St. Charles Drift (Willman and Frye, 1970, p 108)—The St Charles Moraine, named for St Charles, Kane County, is a weakly morainic area traced for 25 miles from the front of the Marseilles Morainic System to the northern part of the Minooka Moraine It marks the front of the very clayey till characteristic of the Yorkville Till Member

Harvard Sublobe Drifts

The Harvard Sublobe (figs Q-9, Q-10) includes six moraines that have a slightly westward bulge north of the Princeton Sublobe They consist of the Tiskilwa, Malden, Yorkville, and Haeger Till Members of the Wedron Formation

Marengo Drift (Leverett, 1899, p 290)—The Marengo Moraine, named for Marengo, McHenry County, is a massive moraine that is largely pink till. It extends southward from the Wisconsin state line for about 40 miles, terminating at the Elburn Complex

Gilberts Drift (Leighton and Ekblaw, 1932, p 48)—The Gilberts Moraine, named for Gilberts, Kane County, is a low area about 30 miles long behind the Marengo Moraine and is largely pinkish gray till, gravel, and lacustrine sediments It is assigned to the Malden Till Member, but it is pinker than the Malden in the Princeton Sublobe.

Huntley Drift (Leighton and Willman, 1953, p 53)—The Huntley Moraine, named for Huntley, McHenry County, is a low, discontinuous ridge about 8 miles long that is largely till of the Yorkville Till Member

Barlina Drift (Willman and Frye, 1970, p 109)—The Barlina Moraine, named for Barlina Road, northwest of Lake-in-the-Hills, McHenry County, is a rough-surfaced ridge about 16 miles long, which, like the Huntley, consists largely of till of the Yorkville Till Member.

Valparaiso Drifts (Leverett, 1897, p 26)—The Valparaiso Morainic System is largely in the Joliet Sublobe, but the West Chicago and Cary Moraines curve northwestward into the Harvard Sublobe, and the drifts are part of the Haeger Till Member

Joliet Sublobe Drifts

The Joliet Sublobe (figs Q-9, Q-10) consists of the moraines that trend essentially parallel to the Lake Michigan shore The lobe contains two morainic systems and 19 named moraines The moraines in the northwest part of the lobe consist of the gravelly till of the Haeger Till Member, but the others are gray clayey till of the Yorkville and Wadsworth Till Members.

Minooka Drift (Leverett, 1897, p 20)—The Minooka Moraine, named for Minooka, Grundy County, forms the outer ridge of the Joliet Sublobe for about 50 miles It ends at the head of Illinois River, where its southward extension was widely eroded by the Kankakee Flood It is mainly the gray clayey till of the Yorkville Till Member

Rockdale Drift (Fisher, 1925, p 87)—The Rockdale Moraine, named for Rockdale, Will County, has a well defined front for 15 miles north of the Des Plaines River Valley and is represented by isolated, weakly morainic areas for 25 miles south of the valley

Wilton Center Drift (Willman and Frye, 1970, p 110)—The Wilton Center Moraine, named for Wilton Center, Will County, is traced for about 35 miles, from the vicinity of the Des Plaines Valley to the Indiana state line

Manhattan Drift (Fisher and Ekblaw, *in* Fisher, 1925, p 89)—The Manhattan Moraine, named for Manhattan, Will County, extends southward from Joliet for about 20 miles.

Valparaiso Drifts—The part of the Valparaiso Morainic System that is in the Joliet Sublobe is a complex of morainic ridges representing temporary stands of the ice front during the building of the system Many ridges are indistinctly traced through parts of the complex but are undifferentiated in other parts The Valparaiso Drift includes a buried drift of questionable age, informally called the Lemont drift (Bretz, 1955), which consists of yellow-gray silty till, sand and gravel, and dune sand, highly contorted in places The Lemont drift occurs locally in the Worth, Sag Bridge, and Lemont areas in Cook County It may be Woodfordian in age, but a leached zone on the gravel has been interpreted as possibly being the Sangamon Soil (Horberg and Potter, 1955) or the Farmdale Soil (Frye and Willman, 1970) It was tentatively assigned to the Winnebago Formation (Willman, 1971)

West Chicago Drift (Leighton, 1925, p 69)—The West Chicago Moraine, named for West Chicago, Du Page County, forms the frontal ridge of the Valparaiso Morainic System from the Wisconsin border to the Indiana state line, about 100 miles It is a rough-surfaced, gravelly moraine in the north but is more clayey south of West Chicago.

Cary Drift (Leighton, 1925, p 69)—The Cary Moraine, named for Cary, McHenry County, occurs in both the Harvard Sublobe and the northern part of the Joliet Sublobe It is about 30 miles long and consists of gravelly till assigned to the Haeger Till Member

Fox Lake Drift (Powers and Ekblaw, 1940, p 1331)—The Fox Lake Moraine, named for the town of Fox Lake, Lake County, is a kame-moraine traced for about 25 miles south from the Wisconsin state line Most of it is gravel, and it is assigned to the Haeger Till Member, although the till in places is clayey and more like that in the Wadsworth Till Member.

Wheaton Drift (Ekblaw, *in* Suter et al , 1959, fig 5)—The Wheaton Moraine, named for Wheaton, Du Page County, is traced for about 60 miles It may be equivalent to the Cary Moraine, but cannot be traced in the intervening area

Keeneyville Drift (Ekblaw, *in* Suter et al., 1959, fig 5)—The Keeneyville Moraine, named for Keeneyville, Du Page County, is traced for about 40 miles Its position in the Valparaiso Morainic System is similar to that of the Fox Lake Moraine farther north

Roselle Drift (Ekblaw, *in* Suter et al , 1959, fig 5)—The Roselle Moraine, named for Roselle, Du Page County, is a narrow ridge traced for about 10 miles

Palatine Drift (Powers and Ekblaw, 1940, p 1331)—The Palatine Moraine, named for Palatine, Cook County, is a relatively weak moraine traced for about 18 miles

Westmont Drift (Willman and Frye, 1970, p 112)—The Westmont Moraine, named for Westmont, Du Page County, is a poorly defined moraine traced for about 40 miles

Clarendon Drift (Leighton, *in* Leighton and Willman, 1953, pl 3)—The Clarendon Moraine, named for Clarendon Hills, Du Page County, is a poorly defined moraine traced for about 25 miles It is the innermost moraine of the Valparaiso Morainic System

Tinley Drift (Leighton and Ekblaw, 1932, p 15, Bretz, 1939, p 50)—The Tinley Moraine, named for Tinley Park, Cook County, the first moraine back of the Valparaiso Morainic System, extends from Wisconsin to Indiana, about 80 miles It has a well defined front, except in the 25 miles south of the Wisconsin state line where it overlaps the Valparaiso Morainic System

Lake Border Drifts (Leverett, 1897, p 42)—The Lake Border Morainic System, named for its position near the shore of Lake Michigan, consists of five closely spaced moraines that are parallel except near the Wisconsin state line where they somewhat overlap The moraines all consist of the gray clayey till of the Wadsworth Till Member

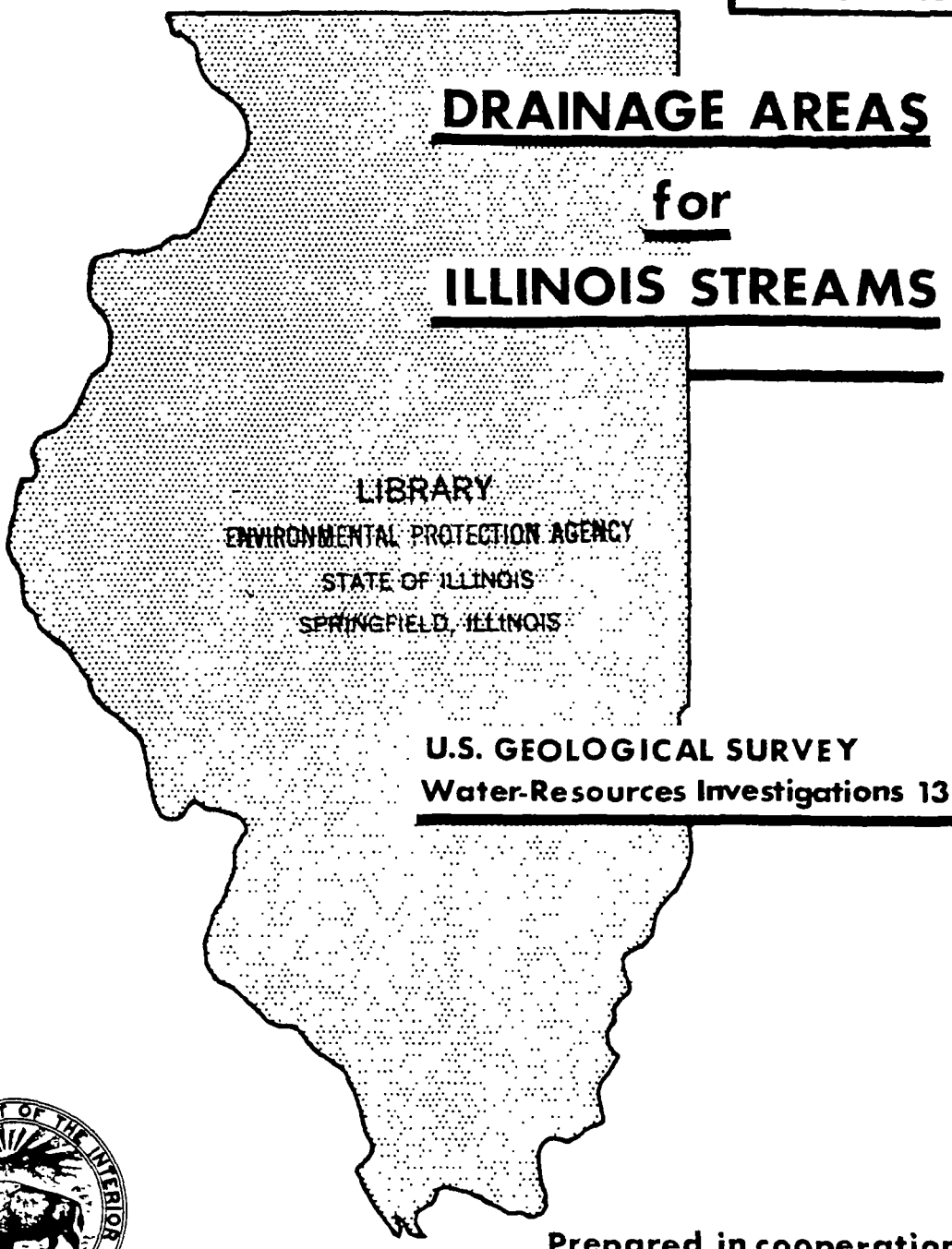
Park Ridge Drift (Bretz, 1939, p 55)—The Park Ridge Moraine, named for the city of Park Ridge, Cook County, is the outermost ridge of the Lake Border Morainic System and is traced from the Wisconsin state line southward for about 40 miles, where it ends at the Lake Chicago Plain It recurs 12 miles farther south in an isolated segment at Blue Island

Deerfield Drift (Bretz, 1939, p 55)—The Deerfield Moraine, named for Deerfield, Lake County, is traced about 30 miles

Blodgett Drift (Bretz, 1939, p 56)—The Blodgett Moraine, named for Blodgett, Lake County, is traced for about 20 miles

Highland Park Drift (Bretz, 1939, p 56)—The Highland Park Moraine, named for Highland Park, Lake County, is traced for about 30 miles The moraine terminates at the Lake Chicago Plain and the Lake Michigan beach

Zion City Drift (Ekblaw, *in* Suter et al , 1959, fig 5)—The Zion City Moraine, named for Zion (formerly called Zion City), Lake County, consists of patches of weak morainic topography near the Wisconsin state line It is eroded at the Lake Michigan beach and is the youngest moraine in Illinois

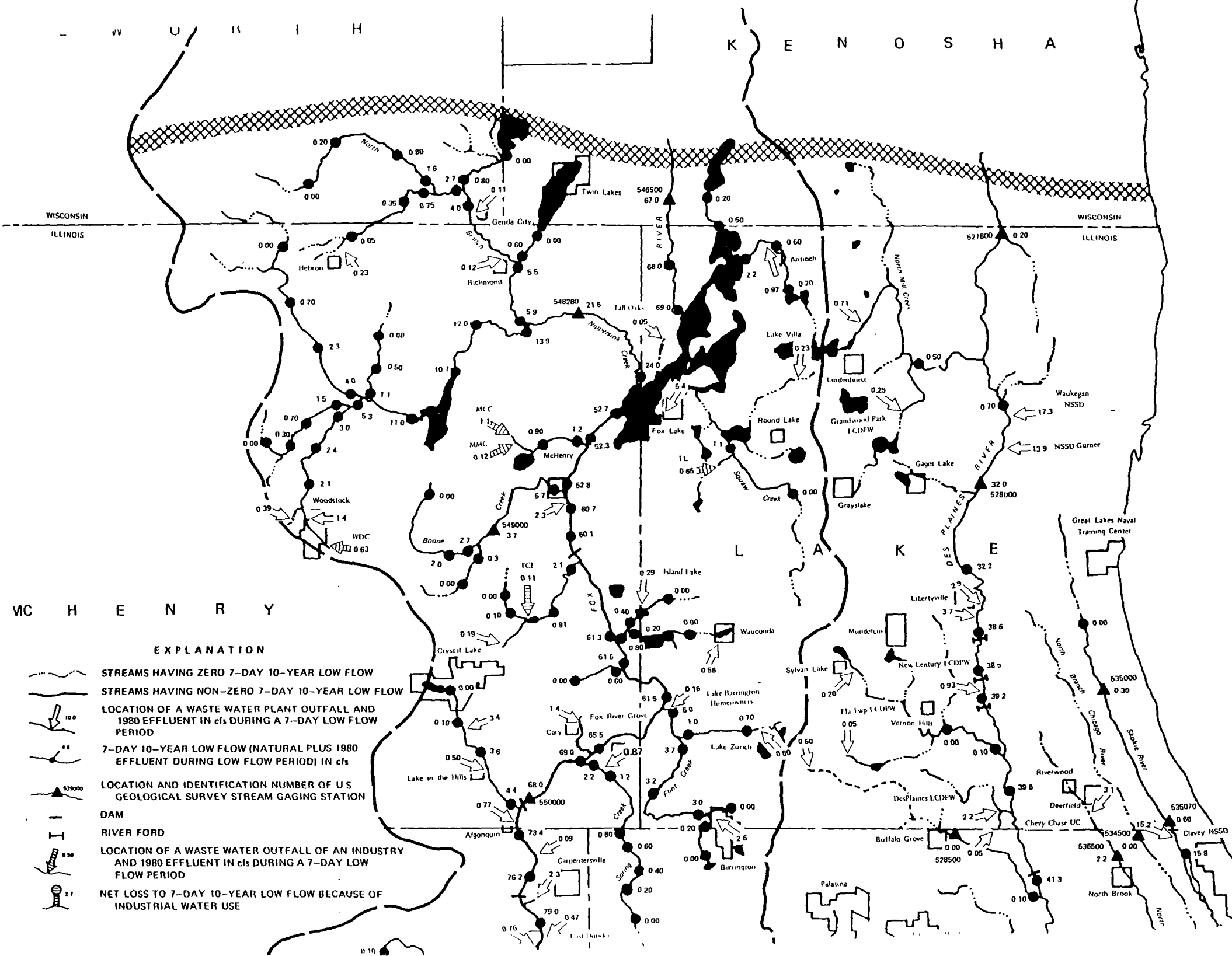


DRAINAGE AREAS for ILLINOIS STREAMS

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations 13-75

Prepared in cooperation with
ILLINOIS INSTITUTE FOR
ENVIRONMENTAL QUALITY

USGS STATION NUMBER	STREAM AND LOCATION	LAND LINE LOCATION			TOPOGRAPHIC QUADRANGLE	COUNTY	TYPE OF SITE	DRAINAGE AREA (sq mi)
		¼ SEC	TOWN-SHIP	RANGE				
	North Branch Nippersink Creek at Ill.-Wis. State line (includes 5.66 sq mi in Wis.)	NW 3	46 N	7 E	Hebron	McHenry	DA	10.8
05548170	North Branch Nippersink Creek at Genoa City, Wis. (includes 6.10 sq mi in Ill.)	SE 35	1 N	18 E	Richmond	Walworth (Wis.)	CSG	42.9
	North Branch Nippersink Creek at Ill.-Wis. State line (includes 6.10 sq mi in Ill.)	SE 35	1 N	18 E	Richmond	Walworth (Wis.)	DA	43.1
05548180	North Branch Nippersink Creek at U. S. Highway 12 at Richmond (includes 38.0 sq mi in Wis.)	SE 9	46 N	8 E	Richmond	McHenry	CSG	50.9
05548190	Elizabeth Lake drain at Ill. Highway 173 at Richmond (includes 9.37 sq mi in Wis.)	SW 10	46 N	8 E	Richmond	McHenry	CSG	13.3
	Elizabeth Lake drain at mouth near Richmond	NE 15	46 N	8 E	Richmond	McHenry	DA	14.2
05548200	North Branch Nippersink Creek near Richmond (includes 47.3 sq mi in Wis.)	SE 16	46 N	8 E	Richmond	McHenry	LPR	66.1
05548210	North Branch Nippersink Creek at U. S. Highway 12 near Solon Mills	NE 21	46 N	8 E	Richmond	McHenry	CSG	67.7
	North Branch Nippersink Creek at mouth nr Solon Mills	NW 27	46 N	8 E	Richmond	McHenry	DA	68.7
	Nippersink Creek at U. S. Hwy. 12 at Ill. Division of Waterways gage at Solon Mills (includes 54.0 sq mi in Wis.)	NW 26	46 N	8 E	Richmond	McHenry	GS	186
05548280	Nippersink Creek near Spring Grove	NW 25	46 N	8 E	Fox Lake	McHenry	GS	192
05548300	Nippersink Creek at Spring Grove	NW 30	46 N	9 E	Fox Lake	McHenry	CSG	199
	Nippersink Creek at U. S. Highway 12 near Fox Lake	NE 5	45 N	9 E	Fox Lake	McHenry	DA	204
	Nippersink Creek at mouth at Fox Lake	SW 4	45 N	9 E	Fox Lake	Lake	DA	205
05548400	Lily Lake drain near Johnsburg	NE 30	45 N	9 E	Wauconda	McHenry	CSG	5.87
	Lily Lake drain at mouth near Johnsburg	NE 19	45 N	9 E	Wauconda	McHenry	DA	7.09
05548500	Fox River at Johnsburg	SW 18	45 N	9 E	Fox Lake	McHenry	GS	1,205
	Dutch Creek:							
05548520	McCullom Lake drain at McCullom Lake	NE 22	45 N	8 E	McHenry	McHenry	CSG	1.43
	McCullom Lake drain at mouth near McCullom Lake	NE 22	45 N	8 E	McHenry	McHenry	DA	1.56
05548530	Dutch Creek at Riverside Drive at Johnsburg	SE 14	45 N	8 E	McHenry	McHenry	CSG	6.98
	Dutch Creek at mouth at Johnsburg	NE 24	45 N	8 E	Wauconda	McHenry	DA	12.6


K E N O S H A
WISCONSIN
ILLINOIS
L A K E
MC H E N R Y
Twin Lakes
Genda City
Burton
Richmond
Hebron
Woodstock
WDC
MCC
MMC
McHenry
Fox Lake
Nippersink Creek
Fall Oaks
Antioch
Lake Villa
Lindenhurst
Round Lake
Grandwood Park FCDPW
Waukegan NSSD
NSSD Gurnee
Gages Lake
Grayslake
TL
Squaw Creek
North Mill Creek
DES PLAINES RIVER
Great Lakes Naval Training Center
Libertyville
Mundelein
New Century FCDPW
Sylvan Lake
Fla Twp FCDPW
Vernon Hills
Riverwood
Deerfield
DesPlaines FCDPW
Chevy Chase UC
Buffalo Grove
Clavey NSSD
North Branch Chicago River
Skokie River
North Brook
Palatine
Barrington
Lake Barrington Homeowners
Lake Zurich
Flint Creek
Spring Creek
Algonquin
Carpentersville
East Dundee
Fox River Grove
Cary
Lake in the Hills
Crystal Lake
Wauconda
Island Lake
Boone Creek
FOX RIVER
ICI
EXPLANATION
STREAMS HAVING ZERO 7-DAY 10-YEAR LOW FLOW
STREAMS HAVING NON-ZERO 7-DAY 10-YEAR LOW FLOW
LOCATION OF A WASTE WATER PLANT OUTFALL AND 1980 EFFLUENT IN cfs DURING A 7-DAY LOW FLOW PERIOD
7-DAY 10-YEAR LOW FLOW (NATURAL PLUS 1980 EFFLUENT DURING LOW FLOW PERIOD) IN cfs
LOCATION AND IDENTIFICATION NUMBER OF U S GEOLOGICAL SURVEY STREAM GAGING STATION
DAM
RIVER FORD
LOCATION OF A WASTE WATER OUTFALL OF AN INDUSTRY AND 1980 EFFLUENT IN cfs DURING A 7-DAY LOW FLOW PERIOD
NET LOSS TO 7-DAY 10-YEAR LOW FLOW BECAUSE OF INDUSTRIAL WATER USE

TAP	RAW SOURCE	STAT	BACK UP	----LEGAL DESCRIPTION----	QUAD	SSCPTBLTY BURL	SPRD	SETBACK	AQUIFER	DPTH
0975238 - HEIDEN GARDENS CNDOS				POPULATION: 260	SRVC CONN: 88			FACL STATUS: A		
01	21044-WELL 1 PTLS ADPTR DISCH TO BSMT BLDG 2	A	N	44N 11E 12 2C 1425N 1100W	007C	E	D2	200	6080	1100
0975250 - COUNTRYSIDE MANOR SBDV				POPULATION: 1,430	SRVC CONN: 477			FACL STATUS: A		
01	20284-WELL 1	A	N	44N 11E 09 2D 2400N 950W	007C	B1		400	5050	168
02	20285-WELL 2	A	N	44N 11E 10 3B 700N 1500W	007C	E		200	5050	242
02	20286-WELL 3	A	N	44N 11E 10 3B 735N 1370W	007C	E	D2	200	6080	1040
0975575 - PARK CITY MHP				POPULATION: 1,600	SRVC CONN: 619			FACL STATUS: A		
01	20253-W3 IN ALLEY S OF MARSHFIELD & W OF TESKE	A	N	45N 11E 25 1F 1852S 260W	007C	E	D2	200	6366	1050
02	20254-WELL 4 HOWARD ST & FREDSON RD	A	N	45N 11E 25 2H 75S 755W	007C	E	D2	200	6393	1203
03	20251-W1 IN ALLEY N OF KEHM & W OF TESKE BLVDD	I	N	45N 11E 25 1E 2350S 183W	007C	E	D2	200	0101	
04	20252-W2 IN ALLEY S OF MARSHFIELD & W OF TESKE	I	N	45N 11E 25 1F 1777S 270W	007C	E	D2	200	0101	
0977350 - WILDWOOD SBDV				POPULATION: 7,100	SRVC CONN: 2,866			FACL STATUS: A		
01	21045-WELL 2 MILL RD	A	N	45N 11E 30 1A 600N 125W	007C	E	D2	200	6080	1845
02	21046-WELL 3 JOHN MOGG RD NEAR ROUTE 120	A	N	45N 11E 31 5G 800S 2750W	007C	E	D2	200	0101	173
03	21047-WELL 4 ON GAGES LAKE RD	A	N	45N 11E 30 4G 750S 2550W	007C	E	D2	200	6080	1320
0975050 - ARDEN SHORES ESTS SBDV				POPULATION: 70	SRVC CONN: 21			FACL STATUS: A		
01	20267-WELL 1 237 BAY SHORE DR E OF RT 131	A	N	44N 12E 17 4G 1000S 2300W	007D	E	D2	200	5050	283
0975585 - ROCKLAND MHP				POPULATION: 100	SRVC CONN: 66			FACL STATUS: A		
01	20220-WELL 1	A	N		007D	E	D2	200		
01	20221-WELL #2	A	N		007D	E	D2	200		
0970050 - ANTIOCH				POPULATION: 4,419	SRVC CONN: 1,500			FACL STATUS: A		
01	20309-WELL 1 ORCHARD AND BROADWAY	A	N	46N 10E 08 7C 1900N 1200E	008A	E	D2	200	0101	216
02	20310-WELL 2 27 FT SOUTH WELL #1	A	N		008A	E	D2	200		226
03	20311-WELL3 E OF RR N OF MCMILLAN RD	A	N	46N 10E 08 4A 600N 2360W	008A	E	D2	200	0101	141
04	20312-WELL 4 BARTLETT RD END OF MCMILLEN DR	A	N	46N 10E 08 3A 350N 1500W	008A	E	D2	200	0101	129
05	20313-WELL5 S OF RT 173 E OF RR 3 OF MAIN ST	A	N	46N 10E 17 4F 1355S 2100W	008A	E	D2	200	0101	131
0970840 - LAKE VILLA				POPULATION: 2,400	SRVC CONN: 352			FACL STATUS: A		
02	00546-W5 BEHIND BODY SHOP 108 S MILWAUKEE	A	N	45N 10E 04 4G 1000S 3010E	008A	AX		400		150
0971000 - LINDENHURST				POPULATION: 7,270	SRVC CONN: 2,349			FACL STATUS: A		
01	20268-WELL 1 HAWTHORNE DR	A	N	45N 10E 02 6H 385S 1450E	008A	E	D2	200	0101	165
02	00549-WELL 6 NW COR OF HIGH PT DR & TEAL ROAD	A	N	46N 10E 36 8E 3160N 270E	008A	E		200	0101	153
02	20269-WL#2 NW COR HIGH PT DR & TEAL ROAD	A	N	46N 10E 36 8E 3150N 300E	008A	E	D2	200	0101	151
03	20270-W3 NE OF STP AT 2060 GRASS LAKE ROAD	A	N	46N 10E 26 4A 345N 2150W	008A	E	D2	200	0101	132
03	20271-WELL 4	A	N	46N 10E 26 4A 335N 2140W	008A	E	D2	200	0101	131
03	20272-WELL 5	A	N	46N 10E 26 4A 325N 2150W	008A	E	D2	200	0101	133
0971550 - ROUND LAKE BEACH				POPULATION: 13,300	SRVC CONN: 4,180			FACL STATUS: A		
01	20314-WELL 1 TOMAHAWK DR OPP WARRIOR DRIVE	B	N	45N 10E 18 2F 1550S 1200W	008A	B1		400	0101	215
05	20318-WELL 6 ROLLINS ROAD AT ROUTE 83	A	N	45N 10E 15 7E 2600S 1300E	008A	E	D2	200	6080	1287
0975139 - ALLENDALE SCH				POPULATION: 100	SRVC CONN: 15			FACL STATUS: A		
01	20230-WELL #1 POWER HOUSE	A	N	45N 10E 05 6C 1970N 3810W	008A	E	D2	200	0101	180

Reference Number 7

TAP	RAW SOURCE	STAT	BACK UP	----LEGAL DESCRIPTION----	QUAD	SSCPTBLTY BURL	SPRD	SETBACK	AQUIFER	DPTH
0975620 - HARBOR RIDGE UTL INC				POPULATION: 246	SRVC CONN:			82	FACL STATUS:	A
01	20247-WELL 1 S SIDE ANTIOC GOLF COURSE CLUB	A	N		008A	E		200		
0970200 - FOX LAKE				POPULATION: 3,789	SRVC CONN:			1,263	FACL STATUS:	A
01	20005-WELL 1 NEAR N EL TK #1	A	Y	45N 09E 09 2G 700S 700W	008B	A2		400	6366	945
01	20006-WELL 2 NR OLD WTR TOWER	I	N	45N 09E 09 2G 713S 700W	008B	A2		400	0101	135
02	20007-WELL # 3 BY 950 EL TK #2	I	Y	45N 09E 11 7B 790N 880E	008B	B1		400	0101	95
0970840 - LAKE VILLA				POPULATION: 2,400	SRVC CONN:			352	FACL STATUS:	A
01	20262-W2 145 BELMONT AV INSIDE OFPUMPHOUSE	A	Y	45N 10E 04 7G 950S 1200E	008B	AX		400	0101	156
01	20264-WELL 4 145 BELMONT AVE OUTSIDE PMPHOUSE	A	N	45N 10E 04 7G 950S 1212E	008B	AX		400	0101	153
02	20263-WELL 3 50 FT SOUTH OF VILLAGE HALL	I	Y	45N 10E 04 4G 1000S 3000E	008B	AX		400	0101	154
0975380 - D L WELL OWNERS ASSN				POPULATION: 130	SRVC CONN:			45	FACL STATUS:	A
01	20001-W1 EAST WELL LAKE SHORE DR & FOREST DR	A	N	45N 09E 14 5B 4200S 2125E	008B	E	D2	200	0101	98
01	20002-W2 WEST WELL LAKE SHORE DR & FOREST DR	A	N	45N 09E 14 5B 4200S 2120E	008B	E	D2	200	0101	60
0975550 - FOX LAKE HLS SBDV				POPULATION: 2,600	SRVC CONN:			695	FACL STATUS:	A
01	20008-WELL 1 S SIDE LEHMAN RD JUST W HYW 59	A	N	45N 09E 01 3H 600S 1848W	008B	E	D2	200	0101	130
02	20009-WELL 2 INTERSECTION LINCOLN AND FAIRVIE	A	N	45N 09E 01 4A 200N 2200W	008B	E	D2	200	0101	126
0975780 - FOX LAKE PLANT 2				POPULATION: 2,517	SRVC CONN:			839	FACL STATUS:	A
01	20010-WELL 1 700 GRASS LK RD	I	N	46N 09E 33 6H 100S 1800E	008B	AX		400	0101	146
02	20011-WELL 2 S OF RES	A	N	46N 09E 33 6H 280S 1865E	008B	AX		400	0101	133
1115700 - WHISPERING HILLS WTR CMPNY				POPULATION: 6,400	SRVC CONN:			1,836	FACL STATUS:	A
	20184-WELL 5 SO SIDE LAKEVIEW ST E OF SUNSET	A		45N 09E 07 3B 850N 3500E	008B	A2		400	5656	250
01	20179-WELL 1A 1300 W JASPER ROAD	A	N	45N 09E 07 2G 1000S 1050W	008B	B2	C2	200	5656	303
02	20180-WELL 2 2009 INDIAN RIDGE	A	N	45N 09E 07 8D 2150N 250E	008B	A2		400	5656	294
03	20181-WELL 3 W OF JCT WILMOT RD & HAYDEN DRIVE	A	N	45N 09E 07 3E 2450S 1800W	008B	A2		400	5656	255
04	20182-WELL 4 5509 HIGHLAND DR	A	N	45N 09E 05 3D 2300N 1820W	008B	A2		400	0101	93
05	20183-WELL 5 ADJACENT TO WELL 4	A	N	45N 09E 05 3D 2320N 1800W	008B	A2		400	0101	202
0971850 - WAUCONDA				POPULATION: 5,909	SRVC CONN:			2,121	FACL STATUS:	A
01	20287-WELL 1 AT REAR OF POLICE STA 100 MAIN ST	A	N	44N 09E 26 1C 1700N 250W	008C	E	D2	200	5050	230
02	20288-W2 AT REAR OF POLICE STA AT 100 MAIN ST	A	N	44N 09E 26 1C 1700N 240W	008C	E	D2	200	5050	257
03	20289-WELL 3 OSAGE ST IN PARK	A	N	44N 09E 26 3B 1000N 1600W	008C	E	D2	200	5050	325
04	20290-WELL 4 BARBARA LN S OF BONNER ROAD	A	N	44N 09E 24 5D 2560N 2100E	008C	E	D2	200	6080	1264
0974540 - ISLAND LAKE				POPULATION: 260	SRVC CONN:			75	FACL STATUS:	A
01	20283-W1 WATERFORD RD	A	N	44N 09E 20 6F 3260N 3825E	008C	A2		400		
02	00543-W2 75 FT SW W1 WATERFORD RD	A	N	44N 09E 20 6F 3215N 3885E	008C	A2		400		
0975080 - ISLAND LAKE WTR CMPNY				POPULATION: 2,300	SRVC CONN:			750	FACL STATUS:	A
01	20280-WELL 1 ON MIDWAY DR END OF JANET COURT	A	N	44N 09E 21 8B 1130N 190E	008C	A2		400	0101	116
02	20281-W2 EASTWAY & FOREST DR	A	N	44N 09E 21 7F 1385S 138E	008C	A2		400	0101	95
03	20282-WELL 3 DOROTHY COURT	A	N	44N 09E 20 1D 1200N 450W	008C	A2		400	0101	122
04	00544-WELL 4 N OF RTE 176 BY JANET CT	I	N		008C	A2		400		

TAP	RAW SOURCE	STAT	BACK UP	----LEGAL DESCRIPTION----	QUAD	SSCPT&LTY BURL	SPRD	SETBACK	AQUIFER	DPTH
0975700 - HILLDALE MANOR WTR CMPNY INC				POPULATION: 380	SRVC CONN:			129	FACL STATUS:	A
01	02305-W1 END OF SOUTH CT	A	N	45N 09E 15 6A 500N 1700E	008C	A2		400	0101	123
02	20306-W2 END OF SOUTH CT	A	N	45N 09E 15 6A 493N 1700E	008C	A2		400	0101	123
1115250 - EASTWOOD MNR WTR CMPNY				POPULATION: 1,120	SRVC CONN:			320	FACL STATUS:	A
01	20171-WELL 1 NEAR ELEVATED TANK	A	Y	45N 08E 25 2A 250N 900W	008C	A2		400	5050	180
02	20172-WELL 2 ON LINCOLN RD W OF CHAPEL HILL R	A	N	45N 08E 25 4D 2550N 2350W	008C	A2		400	0156	220
1115270 - C AND A WTR CORP				POPULATION: 40	SRVC CONN:			14	FACL STATUS:	A
	20166-WELL 1 ISWS NO 3	A		44N 09E 05 4G 4510N 2540W	008C	E	D2	200	0101	280
1115350 - COMMUNITY SRVC CORP				POPULATION: 645	SRVC CONN:			215	FACL STATUS:	A
01	20175-WELL 1 INTERSECTION OF SUNSET-DRIFTWOOD	A	Y	44N 09E 18 3F 1700S 1500W	008C	A2		400	0101	103
02	20176-WELL 2 12 FT SOUTH OF WELL #1	A	N	44N 09E 18 3F 1712S 1500W	008C	A2		400	0101	108
1115600 - NUNDA UTL CMPNY				POPULATION: 456	SRVC CONN:			152	FACL STATUS:	A
01	20161-WELL 1 AT 713 WEST PETER ST	A	N	44N 09E 29 6D 2550N 1500E	008C	A2		400	5656	189
0970250 - GRAYS LAKE				POPULATION: 5,700	SRVC CONN:			1,823	FACL STATUS:	A
01	20240-WELL #1 HAWLEY ST NEAR CORNER WHITNEY	A	N	45N 10E 26 7B 1200N 840E	008D	E	D2	200	6080	1039
02	20241-WELL #3 ALLEGHENY AND SIWIHA STREETS	A	N	45N 10E 27 5D 2000N 2500E	008D	E	D2	200	5050	339
03	20242-WELL #4 OLD CENTER STREET EAST OF HYW 83	A	N	45N 10E 26 2B 1150N 1250W	008D	E	D2	200	6080	1354
0971150 - MUNDELEIN				POPULATION: 17,200	SRVC CONN:			4,896	FACL STATUS:	A
01	21003-W3 STDBY S OF LK LOCH LOMOND ON EDGEMONT	A	Y	44N 10E 24 3D 2400N 1492W	008D	E	D2	200	5050	276
01	21004-WELL 4 STANDBY WELL NEXT TO W3 IN PMPHSE	A	Y	44N 10E 24 3D 2400N 1500W	008D	E	D2	200	5050	270
02	21005-WELL 5 LOCATED ON KILLARNEY PASS CIRCLE	A	N	44N 10E 24 3G 1225S 1550W	008D	E	D2	200	0101	140
04	21007-WELL 7 ON BANBURY RD1 BLK S OFDUNBAR AVE	A	N	44N 10E 24 1G 1000S 300W	008D	E	D2	200	0101	165
06	21009-WELL 9 ON WINCHESTERRD W OF MIDLOTHIAN R	A	N	44N 10E 12 8A 150N 150E	008D	E	D2	200	6080	1380
07	21010-WELL 10	A	N	44N 10E 25 1C 1560N 655W	008D	E	D2	200	6080	1421
0971500 - ROUND LAKE				POPULATION: 2,650	SRVC CONN:			750	FACL STATUS:	A
01	20298-WELL 1	A	N	45N 10E 29 4F 1550S 2400W	008D	E	D2	200	5050	350
02	20299-WELL 2	A	N	45N 10E 29 5H 600S 2175E	008D	E	D2	200	5050	359
03	20300-WELL 3	A	N	45N 10E 30 3D 2600N 1575W	008D	E	D2	200	6080	1241
0971550 - ROUND LAKE BEACH				POPULATION: 13,300	SRVC CONN:			4,180	FACL STATUS:	A
02	20315-WELL 3 EAST END DR OPP WILDWOOD DRIVE	A	N	45N 10E 16 5A 205N 2550E	008D	B1		200	5050	342
03	20316-WELL 4 NE	A	N	45N 10E 16 3A 75N 1590W	008D	B1	D2	200	5050	314
04	20317-WELL 5 SE COR LONGLAKE DR & SOUTHMOOR L	A	N	45N 10E 19 2E 2500S 750W	008D	E	D2	200	5050	300
06	20319-WELL 7 NW COR CEDAR LAKE & OAKWOOD DR	A	Y	45N 10E 20 4H 50S 800W	008D	E	D2	200	6080	2000
0971600 - ROUND LAKE PARK				POPULATION: 4,050	SRVC CONN:			1,318	FACL STATUS:	A
01	20301-WELL 1	A	N	45N 10E 28 6H 618S 1450E	008D	E	D2	200	5050	279
01	20302-WELL 2	A	N	45N 10E 28 6H 568S 1350E	008D	E	D2	200	5050	313
01	20303-WELL 3 S OF RR ON CLIFTON ST	A	N	45N 10E 28 8C 1800N 600E	008D	E	D2	200	5050	330
01	20304-WELL 4 NEAR WELL 3	A	N	45N 10E 28 8C 1800N 610E	008D	E	D2	200		
0975165 - CHAIN O LAKES MHP				POPULATION: 100	SRVC CONN:			66	FACL STATUS:	A
01	20265-WELL 1	A	N	45N 10E 31 4E 2550S 2300W	008D	B1		400	5050	300

APPROXIMATE SCALE

1000 0 1000 FEET

Reference Number 8

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

VILLAGE OF

FOX LAKE, ILLINOIS

LAKE AND McHENRY COUNTIES

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER
170362 0005 E

MAP REVISED:
JUNE 17, 1986

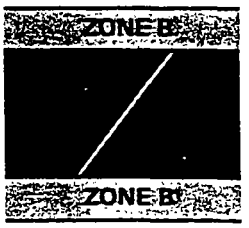
Federal Emergency Management Agency

KEY TO MAP

500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations*



100-Year Flood Boundary

500-Year Flood Boundary

Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7×

Zone D Boundary

River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

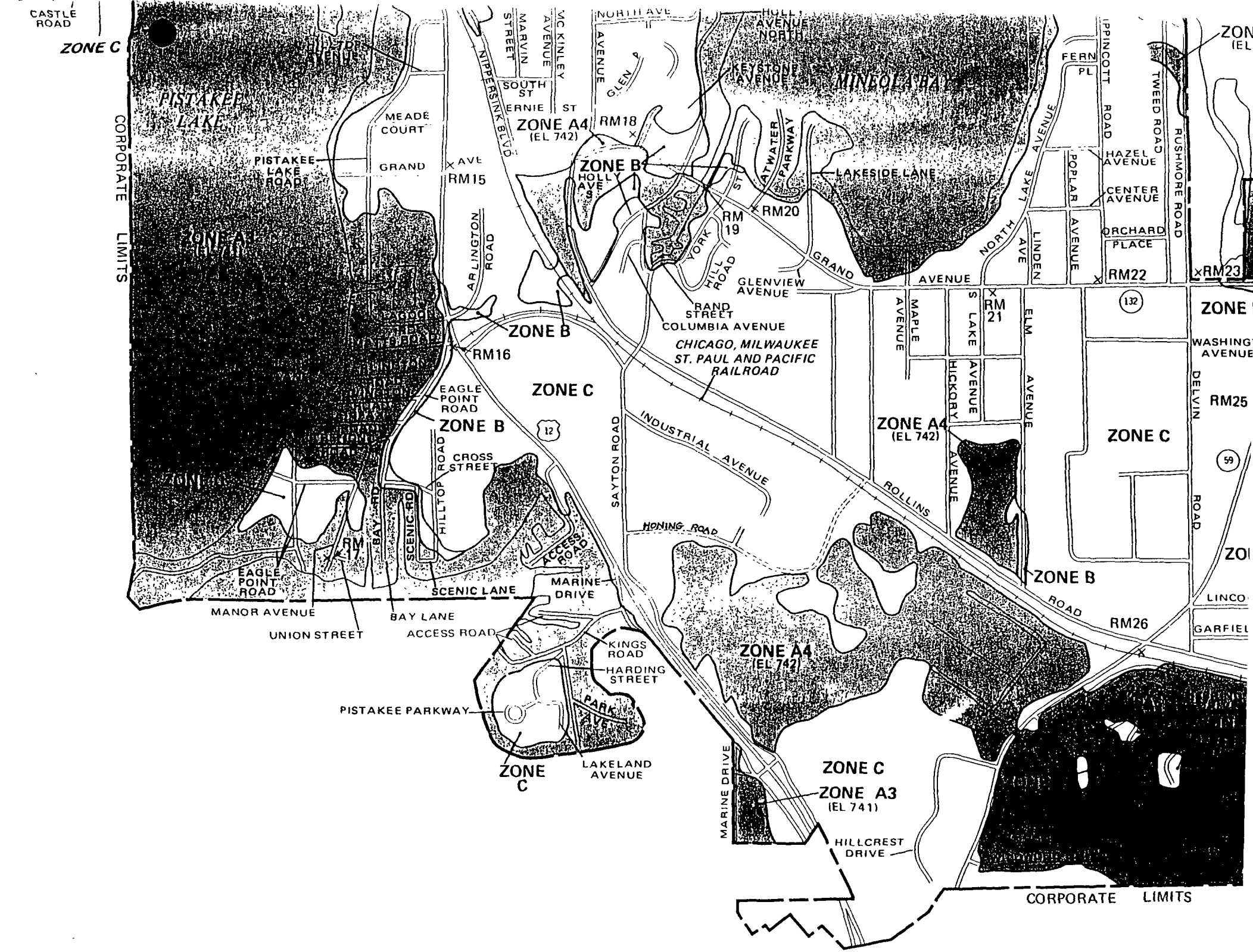
*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood, base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.


CASTLE ROAD
ZONE C
CORPORATE LIMITS
PISTAKEE LAKE
MEADE COURT
PISTAKEE LAKE ROAD
GRAND AVE
RM15
ZONE A1
(EL 741)
ARLINGTON ROAD
NIPPERSINK BLVD
MARVIN STREET
MC KINLEY AVENUE
SOUTH ST
ERNIE ST
NORTH AVE
GLEN AVENUE
ZONE A4
(EL 742)
RM18
HOLLY AVE
ZONE B
RM 19
RM20
KEYSTONE AVENUE
MINEOLA BAY
HULL AVENUE NORTH
ATWATER PARKWAY
LAKESIDE LANE
FERN PL
IPPINCOTT ROAD
TWEED ROAD
RUSHMORE ROAD
HAZEL AVENUE
CENTER AVENUE
ORCHARD PLACE
RM22
RM23
POPLAR AVENUE
NORTH LAKE AVENUE
LINDEN AVE
YORK HILL ROAD
GRAND AVENUE
GLENVIEW AVENUE
RAND STREET
COLUMBIA AVENUE
CHICAGO, MILWAUKEE ST. PAUL AND PACIFIC RAILROAD
MAPLE AVENUE
S LAKE AVENUE
HICKORY AVENUE
RM 21
ELM AVENUE
132
ZONE
WASHINGTON AVENUE
DELVIN ROAD
RM25
59
EAGLE POINT ROAD
ZONE B
ZONE C
12
CROSS STREET
HILLTOP ROAD
SAYTON ROAD
INDUSTRIAL AVENUE
ROLLINS AVENUE
ZONE A4
(EL 742)
ZONE C
HONING ROAD
ZONE B
ROAD
RM26
LINCOLN
GARFIELD
RM 17
BAY RD
SCENIC RD
ACCESS ROAD
MARINE DRIVE
SCENIC LANE
EAGLE POINT ROAD
MANOR AVENUE
UNION STREET
BAY LANE
ACCESS ROAD
KINGS ROAD
HARDING STREET
ZONE A4
(EL 742)
PISTAKEE PARKWAY
PARK AVE
LAKELAND AVENUE
ZONE C
ZONE C
ZONE A3
(EL 741)
MARINE DRIVE
HILLCREST DRIVE
CORPORATE LIMITS

Reference Number 9

Baxter & Woodman

environmental engineers

July 28, 1992

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Lawrence Eastep, P.E., Manager
Division of Land Pollution Control
Permit Section
Illinois Environmental Protection Agency
2200 Churchill Road, Box 19276
Springfield, Illinois 62794-9276

Subject: Precision Chrome, Inc.
Fox Lake, Illinois, Lake County
ILD089 062871

Dear Mr. Eastep:

Precision Chrome, Inc. has retained Baxter & Woodman, Inc. to prepare a Closure Plan for its hazardous waste management facility located in Fox Lake, Illinois. The hazardous waste management facility at this plant is the surface impoundment (see attachment A) located approximately 80 feet to the south of the plant. Although no treatment is currently being done, the IEPA has determined that the pond is required to go through closure under RCRA at the termination of its service life.

Precision Chrome maintains a manufacturing plant on Precision Road in Fox Lake, Illinois. The plant is located within the Fox Lake quadrangle, Township 45 North, Range 9 East, Section 10, Southwest Quarter (see attachment B). There are a large number of water supply wells in the area, well records obtained from the state water survey for Section 10 are presented in attachment C. There are two wells on the site. One is approximately 120 feet deep that provides water service, the other other well is approximately 30 feet deep and is used to recharge the pond due to evaporative losses.

Precision Chrome, Inc. manufactures shafts used primarily in hydraulic equipment, employing approximately 30 people. Precision Chrome purchases steel tubing and bar stock. This material is centerless ground to final size, induction hardened and then chrome electroplated. Quenching during the induction hardening process is done with a heat exchanger and non-contact cooling water from the on-site pond. Non-contact cooling water is also used to maintain a constant temperature in the plating tanks. The plant has the Standard Industrial Classification Code 3471.

Precision Chrome does not generate a regulated hazardous waste. Chromic acid solution is generated at this facility at a rate of approximately 1 drum every 3-4 months. For at least the past 12 years this waste has been sent to a company meeting the special requirements for hazardous waste which is used or re-used per the USEPA.

Precision Chrome is currently utilizing the surface impoundment for in their non-contact cooling water system. When Precision Chrome decides to close the surface impoundment, closure will be conducted in the following sequence:

1. Notify the Agency in writing at least 60 days prior to beginning closure.

2. Remove the pumping station from service, disconnect and plug the supply and return piping.

3. Collect samples from the water in the pond and the pond sediment and analyze them for hexavalent chromium and total chromium. Sampling and analytical procedures will be conducted in accordance with the latest edition of SW-846. To demonstrate that a parameter is not present in a sample, analysis results will show a detection limit equal to or less than the PQL for that parameter in the latest edition of SW-846.

4. Submit to the IEPA the analytical information for review along with a letter requesting the agency to set site specific cleanup objectives.

5. Compile and submit a Closure Documentation Report to the Agency if the analyses from the site are below the site specific cleanup objectives. A letter requesting final closure approval will accompany the Closure Documentation Report.

6. Conduct an investigation if the analyses from the site are above the site specific cleanup objectives. The investigation will determine the extent of contamination.

7. Remediate the site specific cleanup objectives in accordance with all federal, state and local requirements. All materials generated during the remediation will be managed as a hazardous waste.

8. Compile and submit a Closure Documentation Report to the Agency along with a letter requesting final closure approval.

If remediation is necessary and the remediation option selected is to close the site as a landfill, a post-closure plan will be prepared and submitted to the Agency within 90 days. The post-closure plan will identify the activities which will be carried on after closure of the surface impoundment and the frequency of these activities.

The Closure Documentation Report will include:

1. The volume of waste and waste residue removed. The term waste includes materials resulting from decontamination activities.

2. A description of the method of waste handling and transport.

3. The waste manifest numbers.

4. Copies of the waste manifests.

5. A description of the sampling and analytical methods used including sample preservation methods and chain-of-custody information.

6. A chronological summary of closure activities and the cost involved.

7. Color photo documentation of closure showing conditions of the plant before, during and after closure.

8. Tests performed, methods and results.

9. A Closure Certification Statement signed by the owner/operator and a Professional Engineer licensed in the State of Illinois.

The cost for the investigative portion of the closure activities previously outlined in Items 1 through 5 is on page 2 is estimated to be $5,000. It is impossible to determine the extent of contamination at this point. A cost estimate for remediation is not included.

If you have any questions regarding this closure plan, please contact me.

Very truly yours,

BAXTER & WOODMAN, INC.
ENVIRONMENTAL ENGINEERS

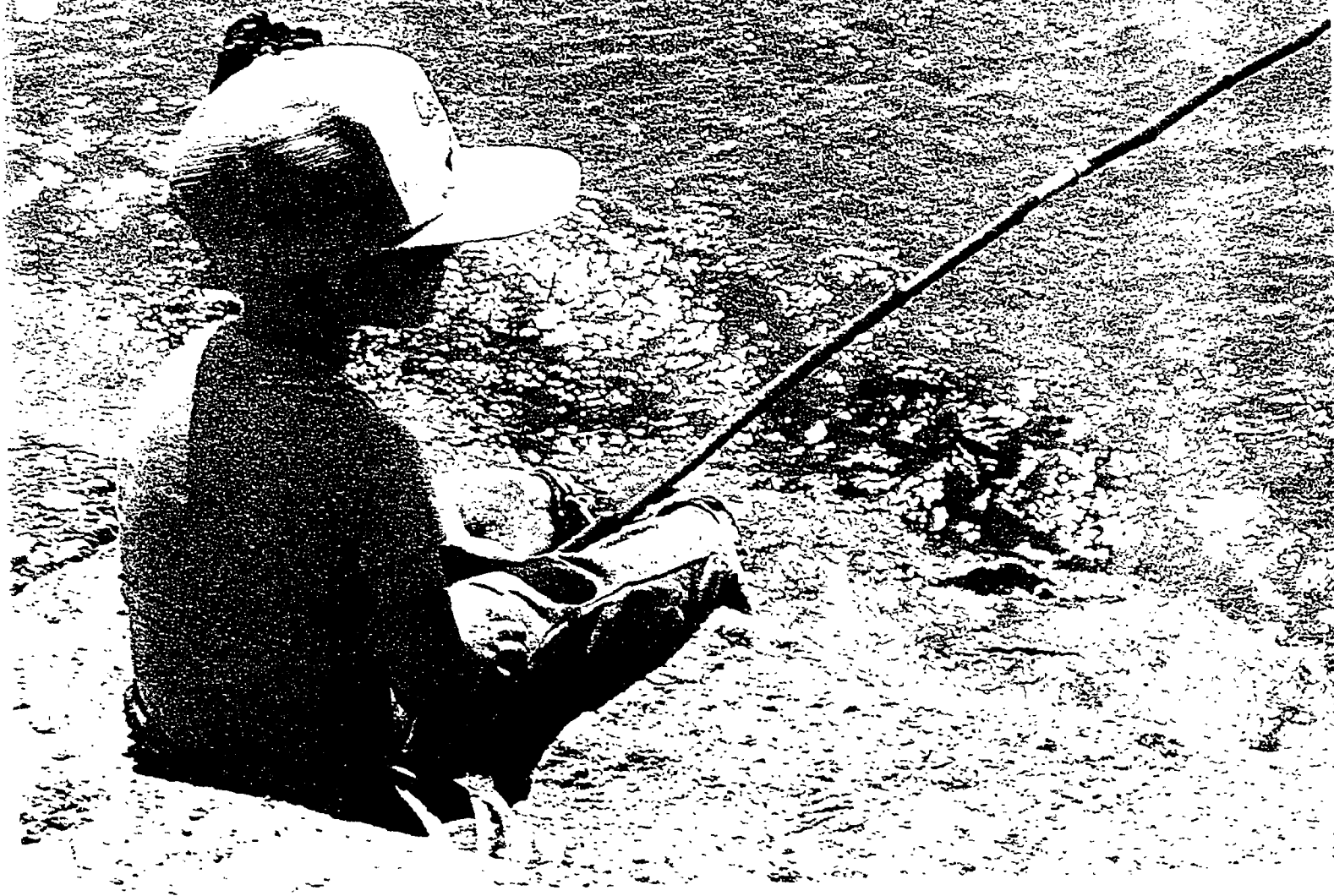
Steven G. Zehner

SGZ:mp
920417/8005A

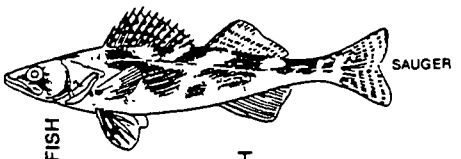
cc: Don Hjortland, Precision Chrome, Inc.
Tom Allen, Precision Chrome, Inc.

ILLINOIS FISHING GUIDE

ILLINOIS DEPARTMENT
OF CONSERVATION
DIVISION OF FISHERIES
in cooperation with
Illinois Department of
Commerce and Community Affairs
Office of Tourism



FISHING WATERS IN ILLINOIS



NAME OF WATER	SIZE	MAX DEPTH (FT)	SHORELINE LENGTH (MILES)	BOAT FISHING	BOAT RENTAL	LAUNCHING RAMP	MOTORS ALLOWED	MOTOR SIZE	SKIING	SWIMMING	CAMPING	PICNICKING	L.M. BASS	S.M. BASS	SPOTTED BASS	BLUEGILL	SUNFISH	CRAPPIE	CHANNEL CATFISH	BULLHEADS	CARP	N. PIKE	WALLEYE	SAUGER	YELLOW PERCH	WHITE BASS	YELLOW BASS	SUCKERS	TROUT	DRUM	STRIPED BASS	HYBRID STRIPED BASS	MUSKELLUNGE	TIGER MUSKIE
Plano Lake	5	22	.5									•	•			•	•											•						
Streams	*Miles*																																	
Aux Sable Creek	*16*	*6*												•			•		•	•	•							•						
Big Rock Creek	*8*	*6*											•	•		•	•		•	•	•							•						
Little Rock Creek	*11*	*6*												•					•	•	•							•						
Blackberry Creek	*8*	*5*												•					•	•	•							•						
Fox River	*20*	*13*		•		•	•					•	•	•		•	•	•	•	•	•	•	•				•	•					•	
Knox County																																		
Lakes	Acres																																	
Lake Storey	132.5	33	5.8	•	•	•	•	T		•	•	•	•			•	•	•	•	•	•													•
Gale Lake	9.8	10	0.5	•			•	T			•	•	•			•	•		•															
Streams	*Miles*																																	
Spoon River	*39*	*10*		•										•			•		•	•	•							•						
Big Haw Creek	*20*	*6*												•		•	•		•	•	•							•						
Cedar Creek	*8*	*7*											•	•		•	•		•	•	•							•						
French Creek	*12*	*8*											•	•		•	•			•	•							•						
Walnut Creek	*17*	*7*												•		•	•		•	•	•							•						
Lake County																																		
Lakes	Acres																																	
Fox Chain O' Lakes*																																		
Bluff Lake	86	13	1.6	•	•	•	•	U	•	•		•	•			•	•	•	•			•	•		•		•							•
Lake Catherine	155	45	2.0	•		•	•	U	•	•		•	•			•	•	•	•			•	•		•		•							•
Channel Lake	352	42	3.6	•	•	•	•	U	•	•	•	•	•			•	•	•	•			•	•		•		•							•
Fox-Nippersink Lk	2120	22	12.2	•	•	•	•	U	•	•	•	•	•			•	•	•	•		•		•		•		•							•
Grass Lake	1360	6	8.5	•	•	•	•	U	•	•	•	•	•			•	•	•	•		•		•				•							•
Lake Marie	480	35	6.0	•	•	•	•	U	•		•	•	•			•	•	•	•			•	•		•		•							•
Petite Lake	167	22	2.0	•	•	•	•	U	•			•	•			•	•	•	•		•	•	•		•		•							•
Pistakee Lake	1700	31	11.8	•	•	•	•	U	•			•	•			•	•	•	•		•		•		•	•	•	•						•
Forest Pres. Dist																																		
Acorn Pond	2	14	0.2									•	•			•	•	•			•													
Banana Pond	3	14	0.2									•	•			•	•		•		•								F					
Beaver Pond	5	8	0.3									•	•			•	•				•													
Casey Pond	3	10	0.2									•	•			•	•																	
Greenbelt Lake 1	5.5	20	0.4									•	•			•			•															
Greenbelt Lake 2	5.5	18	0.4									•	•			•			•															
Heron Pond	4	10	0.3									•	•			•	•				•													
Mill Pond	5	14	0.4									•	•			•	•					•							•					
Missing Lake	5	10	0.7									•	•			•	•																	
North Pond	1	10	0.1									•	•			•	•																	
Old School Pond	3	20	0.2									•	•			•	•																	
S. Economy Gravel Pit	18	36	1.0									•	•			•		•				•	•						•					
Sterling Lake	74	29	2.2									•	•	•		•		•	•		•	•	•	•		•		•	•					
Taylor Lake	8	20	0.5									•	•			•	•	•	•		•													
Wright Woods Pond	2	18	0.2									•	•			•	•	•	•			•							•					
Other Public Lakes																																		
Turner Lake	34	9	0.8	•		•	•	T				•	•	•		•	•			•	•		•											
Sand Lake	15	11	0.4									•	•	•		•	•	•	•							•			•					
Il. Beach S.P. Pond	16	12	3.0									•	•	•		•	•	•	•		•	•	•						•					
Bangs Lake	297	25	3.1	•	•	•	•	U	•	•		•	•			•	•	•			•	•	•			•		•						
Cedar Lake	285	40	3.2	•	•	•	•		•	•		•	•			•	•	•	•		•	•	•			•			•					•
Diamond Lake	149	24	2.1	•	•	•	•		•	•		•	•			•	•	•			•	•	•			•								
Gages Lake	139	48	3.1	•		•	•		•	•		•	•			•	•	•				•				•		•						
Round Lake	215	35	2.3	•	•	•	•		•	•		•	•			•	•	•			•					•								
Lake Zurich	228	32	3.2		•		•			•		•	•			•	•	•			•	•	•			•								
Lk Michigan Shoreline*	488,000	470	25.2	•	•	•	•	U	•	•	•	•		•		•	•				•	•				•				•				
Streams	*Miles*																																	
Des Plaines River	*22*	*14*			•			•						•			•	•	•		•	•	•			•			•					
Fox River	*6*	*12*			•	•	•	•	U			•	•	•	•		•	•	•	•		•	•	•		•	•	•	•					•
Sequoit Creek	*5*	*5*			•	•	•	•					•	•			•	•	•	•		•	•	•		•	•	•	•					
Squaw Creek	*4*	*8*			•	•								•			•	•	•	•		•	•			•	•	•	•					
Nippersink Creek	*1*	*8*			•	•	•							•	•		•	•	•	•		•	•	•		•	•	•	•					•

*Lake Michigan and Fox Chain O' Lakes Fishing Guides can be obtained from IDOC Division of Fisheries 524 S. Second St. Lincoln Tower Plaza Springfield, IL 62706